PALEOPATHOLOGY IN HUMAN SKELETAL REMAINS FROM THE PRE-METAL, BRONZE AND IRON AGES, NORTHEASTERN THAILAND

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ABSTRACT

The traditional bio-archeological model of human health and disease holds that movement of human populations from a hunter-gatherer economy to sedentary agriculture results in a decline in health. Using a suite of skeletal indicators of physiological stress, this model has been tested on archaeological populations world-wide, but has seen limited application in Southeast Asia. Skeletal samples from two archaeological sites in northeast Thailand, Ban Chiang and Non Nok Tha, which span this transition during the pre-metal, bronze, and iron age periods, are examined relative to two hypotheses: 1) ancient inhabitants of the region have low prevalences of skeletal stress indicators, and 2) stress indicators increase over time.

Paleodemographic estimators are comparable in the two groups and suggest the populations were stationary or slightly declining. The frequencies of dental pathologies are consistent with a "pre-agricultural" economy, even in the later phases of occupation. Skeletal evidence of anemia is noted in both samples, but pathognomonic evidence of genetic anemia is not. Mean cranial vault thickness measurements are consistent with other neolithic populations. Advanced osteoarthritis is rare in these samples, but slight osteoarthritic changes are common in both the appendicular and vertebral skeleton. Healed fractures, including the cranial vault, ribs, radius, vertebrae (including spondylolysis), and long limb bones, are consistent with accidental injury. Evidence of infectious disease includes the presence of residual childhood ear infections, uncommon occurrences of non-specific skeletal lesions, and probable tuberculosis in the later phases at Non Nok Tha.

Temporal analysis demonstrates a general continuum of increasing frequencies of the majority of indicators beginning with the early phases at Non Nok Tha and ending with the

later periods at Ban Chiang, which correspond to cultural, environmental and technological transitions evident at both sites. Sex differences noted in the prevalence of many of the stress indicators, and variation in the temporal trends suggest differential gender activities and/or access to food resources. The more dramatic effects of human domestication seen in other regions of the world are not found in these sites, perhaps reflecting the maintanence of a broad-ranging economy.

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CHAPTER 1. INTRODUCTION

PROBLEM

Extensive archaeological research among Amerindian and Mediterranean groups has been conducted in an attempt to document the transition to agriculture and its subsequent effects on human health (Cohen 1977, 1988; Cohen and Armelagos 1984). However, very little attention has been given to these same issues in human populations found living in the unique tropical monsoon environment of Southeast Asia. Domestication of several plants and animals, most notably rice, has long been argued to have occurred early (prior to 3,000 BC) in the greater Southeast Asian region (Gorman 1970, Misra and Bellwood 1985, Chang 1989, Pyramarn 1989). The intensification of rice cultivation has been seen as the catalyst for the expansion of trade networks, centralization, and the subsequent infiltration of other peoples and cultures (Higham 1989). Through a study of human skeletal remains, this dissertation will address the health status of the ancient inhabitants of northeast Thailand, from an early stage in the region's use of rice cultivation through its intensification.

The use of skeletal remains to illuminate the condition of past human populations has a long tradition. At first focusing on "anecdotal" case studies, then responding to movement toward population analysis in the 1950's, investigating the regression of health during the middle ages and following the advent of agriculture (e.g. Cohen and Armelagos 1984), and finally documenting the ill effects of contact between peoples (e.g. Larsen and Milner 1994, Verano and Ubelaker 1992). In all of these investigations, populations from Asia in general, and Southeast Asia in particular, are noticeably absent. While human fossils have been found to the north and south, and Asia has been proposed as a "seat" of humankind (Thorne and Wolpoff 1992, Kramer 1991), there is relatively little known of the nature and progress of human life in this area. This lack of knowledge is being amended at a rapidly quickening pace by a world-wide coalition of investigators who have consistently applied themselves to problems of this region (Higham 1989, Higham et al. 1992, Bellwood 1985, Welch and McNeil 1990, White 1995). This dissertation is interested in two problems: first, documenting the health and disease of some of the early inhabitants of northeast Thailand; and second, examining the evidence for change over time.

PREHISTORY OVERVIEW

The history of human settlement in Thailand was virtually unknown prior to the pioneering efforts of Dr. Wilhelm Solheim III and the University of Hawai`i and the Thai Fine Arts Department Salvage Archaeological Project in the early 1960's. Since that time, both foreign and Thai archaeologists have slowly begun to fill in the blanks. Extensive surveys and problem-oriented areal excavations have contributed to the framework of an archaeological understanding of human settlement in this neglected research area (Wilen 1986; Welch 1985, 1989). The unique requirements and ecology of the tropical environment has received much attention in the world of human paleontology of late (Trinkaus 1991, Thorne and Wolpoff 1992, Mellars 1991), pointing out the problematic absence of archaeological remains of technologies based upon wood, bamboo and fiber (Pope 1989, Mellars 1991). However, the human transitions from mobile hunting and gathering bands to sedentary agriculturists in Southeast Asia are little known.

The earliest evidence of modern human presence in Thailand (approximately 37,000 BC) was recently recovered from the Lang Rongrien rockshelter in southwest Thailand (Anderson 1990). Cultural remains from this and other cave sites (e.g. Gorman 1970, 1971) are interpreted as evidence of transient occupation by mobile people, utilizing the changing resources of the mountain forests (evergreen tropical rain forest). These sites contain pottery, and evidence of an impressive array of nuts, fruits and grains (including betelnut and rice), nine of which are still cultivated (White 1989).

Bayard first introduced the idea of a regional phase chronology to assist "outsiders" in understanding the prehistory of northeast Thailand (1984c). The exact dating sequences are elusive, contended, variable (c.f. Bayard 1986, Higham 1986, 1994; White 1988, 1990), and beyond the scope of this brief summary. Since the exact dates are less important than grasping the general transitions, a middle-ground is proposed here with the caveat that all dates are approximate. The regional chronology is divided alphabetically into four "General Periods" as follows (Bayard 1984c, Higham 1989).

General Period A (3500-2,000 B.C.): Occupation by semi-sedentary communities with noticeable but weak social ranking, and either swidden agriculture, or extension of wild habitat cultivators. Settlements are typically located adjacent to soils, land forms, and water resources suited to rice (Higham 1989, Wilen 1986-87). Sites are restricted to small stream valleys and the margins of the flood plains, suggesting continued reliance on hunting and gathering in a wide resource base, in addition to domesticated cattle, pigs, and dogs. Sites such as Ban Chiang (Early Periods I-II), Non Nok Tha, Ban Na Di, and Non Pa Kluay, in northeast Thailand, are representative of this phase.

General Period B (2,000-500 B.C.): Small, sedentary, autonomous communities characterize this phase, still concentrated along stream tributaries where rice could be cultivated by extension of the natural environment of the wild grain, and where utilization of the upland forest for subsistence could continue. Bronze technology is beginning, with an increase in ranking and a strengthening of trade links. Representative of this period in northeast Thailand are the sites of Ban Chiang, Non Nok Tha, and Ban Na Di.

General Period C (500 B.C.-A.D. 500): Appearance of iron and water buffalo remains, with evidence of intensive "wet rice" cultivation in paddy fields (Higham and Kjingam 1979), and a marked increase in ranking. There is a continuation of trade networks, but the material traded changes. Increased site density, with a trend toward centralization, as well as movement away from the mountain resources and out onto the alluvial plain (Welch 1985). Earliest evidence, in the form of glass beads, for participation in long distance trade networks with China and India (White 1986).

General Period D (A.D. 500 - present): Rise of incipient states or complex chiefdoms. Evidence of Indian influence in religion and socio-political changes. Occurrence of moated and walled sites, with increase in size (38 ha).

Although this general sequence is broadly accepted, the driving force behind the changes is in dispute. While population pressure was the theory of choice in the 1970's (Cohen 1977), the absence of evidence for large population concentrations in Southeast Asia, even in the presence of metal, suggested that this was not the ideal theory for this region (Solheim 1970). Instead, an ecological explanation referencing the diversity of the tropical environment, and especially the unpredictability of the monsoonal climate, was utilized to explain these transitions (Hutterer 1976a, Welch 1985, Kennedy 1976). Welch (1985) proposes the presence of a diversification/intensification strategy for dealing with the climactic unpredictability: diversification can be utilized by upland settlements close to multiple resources and ecotones, while settlements out on the alluvial plain must be able to control water, resulting in intensification of a single resource.

Still, archaeological research in Thailand is revealing remarkable variability in conforming to the General Period model (e.g., the central Thai site of Ban Kao lacks bronze during phases when it is present elsewhere in Thailand). Hutterer (1976a, 1976b) interprets this lack of "domino" timing as a reflection of the variable tropical environment. There is both lateral and vertical transformation, and because the subsistence systems are not the same, there are differences in technology. Variability is also the hallmark of Kennedy's (1976) interpretation of a region well known for diversity (see also White 1995). The artifactual evidence argues against outside influence for change since the inhabitants are making similar objects from different materials, e.g. replacing long standing shell trade networks with glass.

While these topics will continue to be debated, the process of settlement and cultural change is of concern here only as it affects the inhabitants themselves. A decline in health is well documented in European and American human populations as the diversification of hunting and gathering gave way to agriculture and the vagaries of weather, pests, and crops. As well, the adoption of a "domesticated" life style has concomitant increases in health hazards associated with domesticated animals, sanitation requirements (both human and animal), population density, landscape change, management of fresh water, etc. The expansion of trading networks also supposes at least intermittent contact among different groups of people with the consequent exchange of pathogens along with material goods.

MODEL

Because health and disease occur in an ecological setting and are intimately affected by human behavior (Brown and Inhorn 1990), an ecological, bio-archaeological approach is appropriate. A variety of ecological models are available for consideration, among them an osteobiographic, or life history, approach (Saul and Saul 1989). Models borrowed from epidemiology are based on the characteristics of the triad: persons, place and time (Dunn and Janes 1986, Powell 1988) but these seem excessively broad in orientation. Comprehensive models proposed in nutritional anthropology include social, cultural, economical, biological and psychological factors (Jerome et al. 1980), many of which are difficult to surmise in an archaeological population. The "cascade model" of exclusion of successive hypotheses to arrive at the most likely explanation, is a methodological approach which could be applied to many different models. Models based on energy flow (Hunt 1978) and ecological models from medical anthropology (Wellin 1977) are all adaptable to skeletal data. Although terminology and emphasis change, all of these frameworks are similar in their consideration of elements of the environment, cultural system and individual. Because many of the indicators of health and disease in skeletal remains are nonspecific, a more general "stress" model is attractive.

"Stress" in this context is "the physiological disruption of an organism resulting from environmental perturbation" (Huss-Ashmore et al. 1982:398). Most stress reactions, or physiological disruptions, cannot be directly observed, but many can be inferred from residual impacts on the skeletal system, such as stress from nutritional deficiency, trauma, physical labor, infectious disease, etc.. The model proposed by Goodman et al. (1984, 1988) [Figure 1] incorporates variables within the environment and the individual, with culture serving as both a buffer and an adverse influence or stressor. The basic theoretical framework of this model is adaptation, which is fueled by pressures or constraints in the environment, the individual, the culture, and the population. The limiting resources of the environment include weather, topography, climate; the quality, quantity, and composition of the diet, inferred from archaeological floral and faunal remains; the presence of domesticated animals (cattle, dogs, etc.); potential parasites, inferred by the presence of their vectors or appropriate environments; and the density and distribution of the population. The practice of betel-nut and tea-leaf chewing, both of which affect the host resistance to stress by an alteration in physiology, are

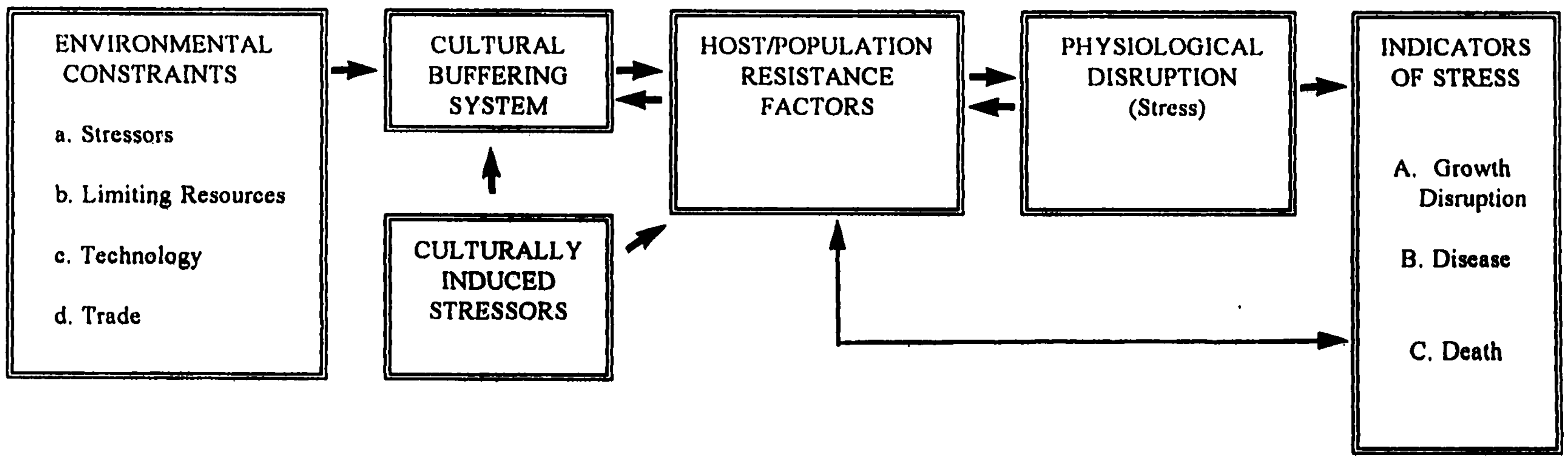


Figure 1.1: Ecological, Bio-archaeological Model (adapted from Goodman et al. 1984, 1988)

examples of culturally-induced stressors (Vimokesant et al. 1975). Host resistance factors incorporate basic genetic (e.g. immunocompetence), and physiological factors (age, sex, etc.) in the individual, and are subject to natural selection pressures over time. The use of this model, as with any ecological model, requires the incorporation of archaeological findings in the interpretation of the evidence from the human skeletal remains.

INDICATORS OF STRESS

Although the bones represent only the skeleton of the living human being, there is a large amount of information which can be gathered and inferred from the detailed analysis of both the bones of an individual, and the collection of individuals that make a skeletal population. In the movement in paleopathology from anecdotal case studies of individual skeletons, to interest in changes in populations, a suite of "indicators" have been identified which appear to support viable inferences, although not without debate, about past health and disease. These indicators form the basis of this investigation of the ancient people of Thailand, and include generalized indicators of stress such as paleodemographic distributions used to estimate mortality, fertility, and provide inferential data on the presence of disease (Palkovich 1978, 1987), stature and dental enamel hypoplasia; and specific indicators of stress such as Harris Lines, porotic hyperostosis, infection, trauma, osteoarthritis, and dental paleopathologies (Goodman et al. 1984; Martin et al. 1985, Rose et al. 1985, Saunders and Katzenberg 1992, Mensforth et al. 1978, Huss-Asmore et al. 1982, Larsen 1987). Recognition of these indicators as complementary, and the systematic collection of data in skeletal populations worldwide, has resulted in landmark studies in the effects on health and disease, of the "origins of agriculture" (e.g. Cohen and Armelagos 1984), and western contact (e.g. Verano and Ubelaker 1992, Larsen and Milner 1994).

There are many other, equally informative, macroscopic and microscopic techniques, including, dental asymmetry, sexual dimorphism, trace element and isotopic analysis of bone collagen, cross-sectional morphology of long limb bones, occupational indicators, etc. which would significantly augment the present analysis (e.g. Larsen 1987). However, since the extant descriptions of the ancient inhabitants of northeast Thailand predate the refinement of many of these indicators, and were not specifically addressing questions of health and disease, it seems best to begin with the more basic data collection. No destructive analysis was utilized. Conclusions of relationship of changes in these indicators to disease, nutrition, etc. must be made with caution and only in the presence of analysis of other factors (i.e. bio-archaeology).

The Paradox

The "osteological paradox", coined by Wood et al. (1992), is the apparent contradiction found in using the skeletons of the dead to make inferences about the living. Crucial to bioarchaeology and its constituents (e.g. paleodemography, paleopathology, etc.) is the belief that the sample of recovered human skeletal remains is representative of its living population. The most obvious, well known and accepted contradictions to this belief are the first three "biases" (Saunders and Hoppa 1993):

1. Environmental mortality bias: Conditions of interment affecting bone preservation, i.e. acid soils, high water content, erosion, heavy clay, etc.

2. Cultural mortality bias: Variables affecting the likelihood of interment, i.e. age, sex, rank, class, cause of death, place of death (e.g. away from home), etc.

3. Archaeological mortality bias: Parameters of the excavation or curation sample, i.e. test pits, complete areal excavation, complete skulls only, etc.

The fourth and more elusive bias, which raised a hue and cry of introspection, retrospection and circumspection (Wood et al. 1992, Cohen 1992, Eisenberg 1992, Lukacs 1992b, Saunders and Hoppa 1993, Goodman 1991, Jackes 1993) is:

4. Biological mortality bias: Selective mortality producing greater frequencies of stress indicators in the skeletal assemblage than in the living population.

Wood et al. (Ibid.) called attention to the fact that most analyses of skeletal populations failed to recognize that the skeletal population is selected by death, which is non-random because of the presence of an individual differential susceptibility to disease and death (or "frailty"). Frailty is extremely difficult to quantify, and involves age, sex, differences in genetic immunocompetence, and socioeconomic, cultural, environmental and/or temporal factors.

Typically, the presence of stress indicators is interpreted to mean poor health, while their absence is interpreted as absence of the stressor, and therefore good health (e.g. Cohen and Armelagos 1984). More recently, though, the presence of an indicator has been interpreted as successful "adaptation", and therefore indicative of good health (Wood et al. 1992, Stuart-Macadam 1991, 1992). Even using this interpretation, however, the absence of an indicator remains problematic, as it may suggest absence of the stressor, death before exposure to the stressor, or high individual frailty.

In attempting to address problems raised by Wood et al., Saunders and Hoppa (1993) tested if "these indicator data accurately or even approximately represent the original biological parameters of the living population" (Ibid:127). Using direct evidence in a study of a living population of subadults, a strong correlation between mortality and reduced growth was found, in a complex and synergistic relationship between "biological, environmental, economic, and social factors" (Ibid:140). Using a model to manipulate theoretical populations, Saunders and Hoppa conclude that the problems of method and demographic reconstruction are as great as the problems of biological mortality bias.

Goodman (1993a, 1993b) completely rejects the frailty argument, which is measured on an individual level, calling instead for a population approach, using multiple indicators, with model building and multidisciplinary research to clarify the contexts of the lesions. Since all of the stress indicators are non-specific, i.e. not always and directly caused by a single, specific, known entity, no extensions can be or should be made between any of the indicators in the skeletal population and a specific disease present in the living population (Ubelaker 1992). Goodman (1993a) also rejects the "adaptation" interpretation of stress indicators, preferring to use the term "survival", this would be in keeping with an allowance for differential "frailty".

The Indicators

General Stress Indicators

Paleodemography

Demography, "the statistical study of populations" (Webster's 1966), provides information for describing a population in space and through time. Although it is possible to collect information from every individual within a population, demographic techniques typically rely upon a sampling of individuals, which are presumed to be representative of the entire population. In "paleo"demography, the study of ancient populations, the unit of study is a sample of the dead.

> "the study of the demography of past populations, and especially of prehistoric and protohistoric communities" (Brothwell 1971:111)

> ". . . a science studying the state, biological dynamics and size of human groups as well as their distribution, on the basis of archaeological sources" (Piontik and Weber (1990:72).

> "the study of vital rates, population distribution, and density in extinct human groups, especially those for which there are no written records" (Buikstra and Konigsberg 1985:316).

From very modest beginnings in the late 1970's (Ubelaker 1978, Brothwell 1981), paleodemography has now expanded into a highly specialized, technical field of computer simulation, model life table comparisons and statistical computations. Paleodemographic data can be used to estimate mortality, fertility, and provide inferential data on the presence of disease (Palkovich 1978, 1987). While advanced paleodemography is clearly beyond this author and this paper, presentation of basic demographic data in a skeletal population is essential to interpretation of the skeletal indicators of stress.

Determination of the stability, fertility and mortality of a skeletal population, depend upon the most precise estimates of age and sex available (Meindl and Lovejoy 1989, Buikstra and Mielke 1985, Jackes 1992) and a sample which is representative of the population (Ubelaker 1989). Although the reliability of age and sex estimates was recognized as problematic in many of the early paleodemographic reconstructions (Lovejoy 1971), more emphasis was placed on the environmental, cultural, and archaeological biases as the greatest cause of error (see above). However, since determinations of age and sex are valuable in detecting the presence of a cultural bias in burial interment, the two are inextricably intertwined.

In the field of paleodemography, however, determination of sex and the problems of accurate age-at-death estimation are primary and daunting (e.g. Howell 1982, Bouquet-Appel and Masset 1982, 1996). It has been suggested that skeletal age distributions are nearly identical to the reference populations used to establish the aging methods, standards from reference populations without all age classes are biased, adults are underaged, and aging methods ignore sex and population specificity. These criticisms spawned much introspection, testing of methods, resolution, and proposition of solutions (e.g. Buikstra and Konigsberg 1985, Jackes 1993).

Sex Determination

The determination of sex in adults, centered primarily on morphological differences in the skull and pelvis, and various measurements of nearly every bone of the skeleton, may be quite accurate depending upon the completeness of the skeleton (Krogman and İşcan 1986). In the presence of a skull and pelvis with good preservation, females are generally sexed correctly, while males are occasionally mis-identified as females (Meindl et al. 1985). Although sexual dimorphism does vary from population to population, there is usually a ready-made, population-specific reference sample (i.e. complete skeletons), to establish measurements, indices, or angles for the determination of sex in incomplete or fragmentary remains.

The determination of sex in subadults is more problematic because of the presumed absence of sexual dimorphism prior to puberty. Measurements of the ilium and pubis in fetuses found significant sex differences in some ethnic groups, and none in others; while measurements of the depth and width of the sciatic notch, and the height and width of the ilium, failed to show significant sex differences in age groups up to 6 months (Krogman and İşcan 1986, Weaver 1980). Morphological variation in the elevation of the auricular surface of the ilium was more productive (Weaver 1980). Recently deciduous tooth measurements (De Vito and Saunders 1990) and morphological observations of the mandible and pubis (Shutkowski 1993) have been proposed, and will be used in this analysis.

Subadult Age-at-Death Determination

Skeletal biologists attempt to estimate the chronological age of a subadult skeleton based upon evidence of growth and development, such as dental calcification, tooth eruption, epiphyseal appearance and fusion, and diaphyseal lengths (Krogman and İşcan 1986). There are sex, and appear to be ethnic differences in the timing of tooth eruption, as well as epiphyseal appearance and fusion. Saunders (1992) has called for greater refinement of age-at-death estimation for the fetal-infant segment of the skeletal population, hoping to distinguish the difference between stillborn, dead neonate, and early fetal death.

At the same given chronological age, a boy and a girl will be at different phases of growth and development, a primary reason for gender-estimation in subadult skeletons. Because the dentition is typically better preserved, dental eruption and calcification standards in deciduous and permanent teeth, have been the mainstay of age estimating methods in subadults. The difficulty of correlating eruption through the soft tissue with eruption in dry bone, the wide variability in tooth eruption, inability to age loose teeth, and the susceptibility of tooth eruption to local factors such as infection, suggest that calcification aging criteria would be more beneficial (Saunders 1992). Radiographs of the dentitions are required, with observed crown development compared to scales derived from radiographs of reference populations (e.g. Moorrees et al. 1963a, 1963b; Demirjian et al. 1973). Problems with calcification criteria include: population and sex-specificity, subjectivity in determining stage, inter-observer error, extrapolation of age in years from a chart, and difficulty in calculating intermediate stages (Saunders 1992, Smith 1991). Among the eruption sequences, the easily applied pictorial representations by Ubelaker (1989), formulated from American Indians and incorporating the earlier end of the chronology, are now recommended by the *Standards for Data Collection* (Buikstra and Ubelaker 1994).

Although long bone growth is more susceptible to environmental stressors (including disease, nutrition, etc.), measurement of the maximum length of major diaphyses, as well as measurements in other bones, also provide information for estimating age and comparing growth (see next section). Diaphyseal length measurements may be compared to reference population information, or correlated with dental age estimates in the same skeletal population (Hoffman 1979; Ubelaker 1989), enabling age estimates in skeletons without dental remains. Epiphyseal fusion is useful in producing general age ranges, since the fusion process may take several years (e.g. Ubelaker 1989:, Webb and Suchey 1985; Alpert and Maples 1995). Again though, the standards are population and gender-specific, and limited in age range by the particular epiphyses available. As in adult age-at-death determinations, use of as many aging criteria as are available seems most logical (Krogman and İşcan 1986).

Adult Age-at-Death Determination

Age-at-death estimation in adults has relied on standards of morphological changes in the symphysis of the os pubis first proposed by Todd (1920, 1921) and refined by others (Table 1.1). Recognition that different parts of the human skeleton age differently, and are preserved differentially, emphasized the need for aging standards on other elements of the skeleton, such as the auricular surface (Lovejoy et al. 1985), sternal rib end (İşcan et al. 1984, 1985), and a refinement of cranial suture aging (Meindl and Lovejoy 1985). Although these authors advise against applying their standards to a different sex or ethnic group, this would effectively eliminate age-at-death determination in nearly every archaeological population in the world.

All of these methods have come under fire for consistently underaging adults, merely recreating the age distribution of the source population, and ignoring possible ethnic

Table 1.1. Methods for Determining Age-at-Death in Adults

Element	Method	Reference Sample	Age Range (Means)	Specificity	Comments*
Os pubis	Todd (1920, 1921)	Hamann-Todd	18-50+ (5 yr intervals)	none	underages at higher intervals
	McKern & Stewart (1957)	Korean War	17-38+	sex (♂)	overages in 20-30 decade, underages in 40-50 decade, attenuated age range
	Gilbert & McKern (1973)		14-59	sex (♀)	overages in 20-30 decade, complicated method
	Brooks & Suchey (1990) Katz & Suchey (1986)	LA County	19.4-60.0 (♂) 18.5-61.2 (♂)	sex	
Auricular surface	Lovejoy et al. (1985)	Hamann-Todd	20-60+ (5 yr intervals)	none	better preserved than pubis inappropriate in females? accurate in young adults
Sternal rib end	İşcan et al. (1984, 1985)	Broward County	16-65+ (♂) 13-70+ (♀)	sex ethnicity	requires excellent preservation requires identification of rib number
Cranial sutures	Meindl & Lovejoy (1985)	Hamann-Todd	30.5-56.2	none	

* Source: İşcan (1989), Krogman and İşcan (1986), Jackes 1992.

differences in aging (Bouquet-Appel and Masset 1982, Jackes 1992). In addition, aging systems based upon the Hammon-Todd reference collection have been attacked because of the lack of the reliability of known ages-at-death in these individuals (İşcan and Loth 1989:31).

A two pronged approach to addressing these concerns has been proposed: improve aging methods, and in the meantime manipulate the demographic data to minimize the effect of these biases (Bouquet-Appel and Masset 1982, 1996; Jackes 1992). Responding to this criticism, new aging methods, including alternative sites for morphological observation, radiologic examination of density in selected bones, and histological evaluation of the number and type of osteons, have been developed and or refined (for review of aging methods see Krogman and İşcan 1986, İşcan 1989, Jackes 1992).

Multi-regional systems of aging, using combinations of aging methods, have also been proposed (e.g. Acsádi and Nemeskéri 1970, Meindl et al. 1983, Lovejoy et al. 1985) and have gained significant interest recently (Bedford et al. 1993). While use of as many indicators as possible is recognized as an essential component of aging a skeleton, because of the innate variability of human beings, and the effects of health, occupation, etc. there are still drawbacks. Research conditions may not allow the use of some of the proposed methods: destructive analysis is becoming less acceptable (especially in the United States), radiographic facilities, computer facilities, and the leisure of time and space for seriation may not be available. In addition, in many archaeological populations, each individual may have only one or two of the aging sites available, thus preventing use of these methods. Also, the issue of preservation and use of incomplete specimens is seldom raised in discussion of these methods. In practice, use of any and/or all of the possible aging methods, even on poorly preserved or incomplete remains, would seem "better than nothing".

In the absence of improvement in adult age-at-death estimation techniques, approaches that shift the focus of paleodemography from mortality (requiring accurate adult age estimations) to fertility (Sattenspiel and Harpending 1983, Buikstra et al. 1986, Roth 1992, Jackes 1992) have been adopted. In this way the primary demographic parameters of the skeletal population might be estimated from the subadult portion of the sample (Bocquet-Appel and Masset 1996). This shift in focus also has problems because fertility estimates depend upon the presence of infants (typically under-represented), and accurate aging of individuals in the 15-45 years age range (Jackes 1992). A number of "estimators" of population dynamics have been proposed (Table 1.2).

Table 1.2. Selected Paleodemographic Estimators

Estimator	Formula	Reference
Average age at death	life expectancy at birth (e_0)	Jackes 1992:213
Juvenile-Adult Ratio	individuals aged 5-14.99 divided by those over 20 years	Bocquet and Masset 1977, Jackes 1992, 1994
Mean Childhood Mortality	${}_5q_5 + {}_5q_{10} + {}_5q_{15}/3$	Jackes 1992, 1994
Fertility	individuals aged over 20 divided by those over age 5 years	Buikstra et al. 1986, Konigsberg et al. 1989

Note: e_0 and ${}_5q_5 + {}_5q_{10} + {}_5q_{15}$ are calculated in an abridged life table. q is the mortality at a given age interval.

An alternative to the traditional, mortality-focused abridged life table (Ubelaker 1989), is proposed by Jackes (1992). All adults are subsumed into a single interval 20-65, which mitigates the effects of underaging adults in the life table, as well as includes the incomplete skeletons which may be broadly aged (i.e. "adult") without elaborate proportional or probability distributions. This life table calculation produces the mortality quotients necessary for estimation of the Mean Childhood Mortality.

Graphing the Mean Childhood Mortality and the Juvenile-Adult Ratio allows comparisons of skeletal samples with historical life table information (Jackes 1992, 1994). This comparison establishes a range of known values, and allows evaluation of possible biases (cultural, archaeological, etc.) in the skeletal sample calculation. As well, fertility estimates can be made based on the MCM:JA position on the plot.

While many of the problems in paleodemographic reconstruction remain unresolved, the use of estimators, as well as judicious interpretation of the data, and the use of a broader regional perspective (Konigsberg and Frankenberg 1994) do seem to provide useful information for interpreting past population dynamics (e.g. Buikstra and Konigsberg 1985).

Growth

Changes in long limb bone length and/or adult stature has been used to infer the presence of various stressors, resulting in a failure to achieve a given growth potential. Among these stressors is the quality and quantity of diet, inability to utilize the available diet because of chronic disease, etc., as well as genetic mechanisms (Huss-Ashmore et al. 1982, Johnston and Zimmer 1989). Thus, in areas with a seasonal decline in resources, growth is slowed at that time, and then recaptured during the season of plenty. Variations in the process and rate of growth have also been proposed as adaptive mechanisms to environmental stress such as high altitude (e.g. Stini 1985).

Any analysis of growth in skeletal remains is entangled in all of the problems discussed above: mortality bias, large human variability in growth, inaccurate sexing and aging methodologies, etc. (Johnston and Zimmer 1989, Saunders 1992). These problems contribute to poor comparability between skeletal samples. Research has documented that "most or all skeletal samples of past groups appear shorter for age than modern groups"

(Saunders 1992:15), which is traditionally interpreted as evidence of environmental stressors. Inter-populational comparison over time has perhaps been the most fruitful analysis, documenting changes in diaphyseal bone length which can be associated with changes in the environment, disease load, subsistence base, etc.

In children, plots of long limb diaphyseal length against dental age have been used to infer a decline in stature, as well as to estimate sex (males are slower to mature and therefore shorter for dental age). In adults, stature estimates, as well as maximum lengths of the long bones (e.g. Cook 1984, Larsen 1984) have been used to propose changes in nutritional status over time. Typically, since the leg contributes more to final stature than the arm, growth and stature are estimated from either the femur or tibia. However, it has been shown in an analysis of immigrant Japanese, that the increase in adult stature associated with an increase in available protein/calories during growth, occurs primarily in the tibia, rather than equally in all of the bones (Kimura 1984). This then suggests that more than one bone needs to be examined in any comparative analysis. In archaeological samples where a single skeleton may have only one complete long limb bone, comparison of like-elements is difficult.

To compensate for this problem, estimates of adult stature, calculated on different bones but using the same suite of formulae, may be used in comparative analyses. Sex-specific regression equations generated from American Black, White, and Mexican male reference samples have been in use for half a century (Trotter and Gleser 1957, 1958, 1970). Recent re-examination of the formulae and methods using the same reference collection has uncovered an error and offered a remedy (Jantz et al. 1994). Other population specific formulae are available (e.g. Houghton et al. 1975), as well as formulae specific for Southeast Asian populations. Dr. Sanjai Sangvichien and others, at the Siriraj Hospital in Bangkok, using a reference collection of modern Thai and Chinese, calculated sex-specific regression equations (Sangvichien et al. 1985, nd). There are two disadvantages of these equations: 1) the Thai sample was mixed with the Chinese, rather than calculated separately, and 2) formulae generated for use on the long bones of the arm have no reported standard error. These formulae, however, do represent the closest population, at least in terms of geography, to the ancient inhabitants of northeast Thailand.

In all cases, caution is urged in applying the formulae only to skeletal remains which are closely related to the original source population so that the proportions and sexual dimorphism are approximated. Among the majority of populations of the world however, skeletal reference collections do not exist and so stature regression formulae do not exist, necessitating indiscriminate use of any formulae (Sjøvold 1990). To address this situation, non-ethnic, non-sex specific equations have been proposed using a mathematical argument which makes the equations reversible (i.e. bone length predicts stature and stature predicts bone length) [Sjøvold 1990].

Dental Enamel Hypoplasia

One of the most common changes to the skeleton, dental enamel hypoplasia, has been linked to a variety of stressors, and, for that reason, is classified as a "generalized" or "non-specific stress indicator" (Goodman et al. 1984). The presence of defects in the enamel of the teeth: visible as horizontal or vertical lines or grooves, single or clusters of pits and changes in the color of the enamel, have been established to result from a variety of stressors, including malnutrition, high fevers, hormonal imbalances, vitamin D deficiency, etc. (Huss-Ashmore et al. 1982, Skinner and Goodman 1992). Research with modern South American children has established the impact of nutritional supplementation (which also reduces infectious disease) in lowering the number of defects (Goodman et al. 1989, Goodman and Rose 1990). Noted in both deciduous and permanent teeth, dental enamel hypoplasias provide an "indelible and retrospective record of growth-disruptive stresses occurring during the period of childhood (birth to about 13 years)" [Lukacs 1989:267].

Although "methods for the study of macroscopic enamel hypoplasia are poorly developed" (Huss-Ashmore et al. 1982:444), it is generally recognized that the kind of defect (i.e. line, pit, etc.), the tooth type, the location on the tooth (qualitatively and quantitatively), the severity of the defect, and the presence of more than one defect should be recorded. The anterior teeth, canines and incisors, provide a record of dental development from prenatal to age seven years, but these teeth are also more likely to be lost post-depositionally.

Measurement of the height of the defect from the cemento-enamel junction, compared against the well documented chronological development of teeth, can give an estimate of the age at which the stress occurred (Goodman et al. 1984). Recognition that the development sequence of the dentition puts specific teeth at risk at specific times is crucial to interpretation of the timing of the hypoplasia (Skinner and Goodman 1992). Thus, the presence of a "peak" of stress at age 3 years, merely reflects a greater availability of developing enamel which can be stressed, rather than representing "weaning stress". Multiple defects in a single individual have been used to infer seasonal stress episodes perhaps associated with scarcity of food, while comparisons of frequency by sex, age, rank, subsistence base, etc. have yielded valuable information on the prevalence of past stressors (Cohen and Armelagos 1984, Lukacs 1989, Goodman et al. 1980).

Linear hypoplasia of the deciduous canine (LHPC) is a unique, isolated hypoplasia which is believed to be caused by mechanical trauma and decreased cortical thickness (Skinner 1986). The defect is produced at an average age of six months and occurs on the labial surface, at the midcrown, of the primary canines. The presence of this defect may offer inferences on biosocial behaviors, including maternal calcium levels (nutritional or vitamin D deficiency) and length of breast feeding, both of which contribute to calcium availability in the child (Skinner and Hung 1989).

Reporting the results of hypoplasia observations is also problematic, traditionally being "per tooth" rather than "per individual". By restricting the tooth classes, separating the first hypoplasia from others, and reporting episodes by individual, some of the methodological problems discussed above can be mitigated (Skinner and Goodman 1992).

Specific Stress Indicators

While paleodemography, growth and stature analysis, and dental enamel hypoplasias provide information only on a general pattern of stress in a population because of the multifactorial causation, there are several skeletal indicators which are more specific.

Porotic Hyperostosis

The occurrence of porotic hyperostosis, a thickening and porosis of the cranial vault and the roof of the orbits (cribra orbitalia), caused by marrow enlargement, is now accepted as an indicator of iron deficiency anemia (Stuart-Macadam 1987a, 1987b, 1989, 1991). The relationship of iron to health and disease is extremely complex as iron is an essential element in both human and animal metabolism (Mensforth et al. 1978, Huss-Ashmore et al. 1982, Stuart-Macadam and Kent 1992). The metabolic pathway for iron in the human body is highly conservative. Recent research has documented the physiological sequestration of iron as a response to infectious disease, thereby depriving the infectious agent of an essential nutrient (Weinberg 1992, Oppenheimer et al. 1986, Lukens 1975, Masawe et al. 1974). Thus, a relative (or physiological) iron deficiency, without compromise of the oxygen carrying capacity of the blood, may be an adaptive response to acute disease.

True iron deficiency anemia may result if there is a dietary deficiency of iron caused by a lack of ingested iron, by the occurrence of binding agents which render the available iron unusable by the body, or by the loss of hemoglobin to the body, such as in infection with intestinal parasites or malaria (Nurse 1979). The hemoglobinopathies also result in clinical iron deficiency anemia, which may further complicate the interpretation of these skeletal indicators. Research has documented that porotic hyperostosis occurs in nonhuman primates, first appears in human remains in the Neolithic, and is more prevalent in lowland populations, and groups close to the Equator (Stuart-Macadam 1991).

The bones of the skeleton serve three functions: support, protection, and blood manufacture (hematopoiesis). Red blood cells are produced by the bone marrow and are recycled in the liver. In a child, nearly all of the bones of the skeleton are involved in hematopoietic function, but as growth is completed, this function is concentrated in the marrow of the large long limb bones, skull and os coxae. Because the child's skeleton is small, nearly all of the available marrow space is utilized for hematopoiesis, while in the adult, there is ample room for marrow expansion within the cancellous bone.

Hemoglobin is the oxygen-carrying molecule contained within the red blood cell, which gives the red color to the blood. The iron required for the production of hemoglobin is acquired from dietary sources, becoming part of a nearly closed system. Iron released during the destruction of old red blood cells is stored in the liver and recycled into new cells.

Anemia, from the Greek ahaima, literally "without blood", refers to a lack of red blood cells or hemoglobin (Webster's 1966), and may be acute or chronic. Anemia may be caused by a disruption in the production of red blood cells, an uncompensated loss of red blood cells, or by a disruption in the production or form of hemoglobin. Thus, massive hemorrhage from a wound results in an acute anemia which may be remedied if the bleeding is stopped and there is available iron and time for the production of new red blood cells. Chronic anemia may result with a very slow loss of blood, such as from a stomach ulcer, intestinal parasites or malaria, which just exceeds blood production. An iron deficiency anemia may result if there is an insufficient supply of iron for hemoglobin production caused by a dietary lack of iron, or failure to absorb the available iron, either because of binding by phytates, malabsorption syndrome, or chronic diarrhea. Anemia may also result when there are disruptions in the hemoglobin molecule itself, as in the genetic anemias (thalassemia, sickle cell anemia). Genetic anemias typically result in an early death in homozygous individuals, and in varying degrees of anemia in those with the trait (heterozygous).

No matter what the cause of the anemia, the reaction of the skeleton is the same: increased production of red blood cells by expanding the hematopoietic tissue of the bone marrow. In physical anthropology, the presence of porotic hyperostosis and cribra orbitalia in the skull, has been synonymous with anemia since they were first recognized by Hrdlička in 1913 and Hooten in 1929 respectively (Steinbock 1976). Porotic hyperostosis is typically described as expansion of the diplöe and pressure erosion of the external table of the cranial vault producing a porosis; and cribra orbitalia, as the presence of coarse sieve-like openings of the roof of the orbits. Cranial vault thickening due to marrow expansion is distinguished from the periostitis of infection because the diplöe itself is thickened rather than the cortex, and there is no layering of the cortical layers (Ortner and Putschar 1981). Cribra orbitalia and porotic hyperostosis are not always associated with each other, suggesting that early changes in the marrow may be reflected in the orbits, and later changes in the skull vault; or that there are individual differences in response (Stuart-Macadam 1992).

The clinical medical literature is replete with information on the genetics, pathology, treatment, and epidemiology, of the anemias, and provides insight into the osseous changes found in the skeleton radiographically (e.g. Caffey 1937, Moseley 1974, Lawson et al. 1981, 1984; Garn 1992). These changes are summarized in Table 1.3, which also documents the suggested differences between sickle cell anemia, thalassemia, and iron deficiency anemia. Expansion of the diploe is not synonymous with vault thickness, which varies by location, gender, ethnicity, etc.; but requires the diploe to be more than 2.3 times the combined thickness of the tables (Stuart-Macadam 1987a, 1987b). Other than differences in severity of pathology, the process of bone infarction and subsequent infection is found only in sickle cell anemia. One of the hallmarks of the reaction of the skeleton to anemia is variability: in most clinical studies the degree of severity of the skeletal response was not reflective of the degree of the anemia. Treatment of the anemia typically results in resolution of the bony changes.

In the anthropological literature, porotic hyperostosis was first associated with the genetic anemias. However, the low frequencies of genetic anemias, the prevalence of cribra orbitalia in areas where there were no known genetic anemias, and the lack of severe bone changes in skeletal remains, shifted attention to iron deficiency, presumably caused by a dietary deficiency, as the etiology (e.g. Goodman et al. 1984, Stuart-Macadam 1987a, 1987b, 1989). Recently, Stuart-Macadam (1991, 1992) has overthrown this traditional interpretation of cribra orbitalia and porotic hyperostosis as indicators of nutritional stress, in favor of the more prevalent stress of "parasite load". New research on the natural history of iron in the body suggests that the iron acquisition system is extremely efficient, and that the human body actually sequesters iron as a defensive reaction to infection (Lukens 1975, Oppenheimer et al. 1986, Weinberg 1992), suggesting a lack of dietary iron would be an unlikely cause.

Table 1.3. Skeletal Changes in Three Kinds of Anemia

Type of Anemia	Sickle Cell	Thalassemia	Fe Deficiency
Cause	abnormal hemoglobin	defect in hemoglobin synthesis	reduction in hemoglobin or red blood cells
Initial evidence	after 6 months of age	1-2 years old regression of changes with age	early infancy-adulthood most common anemia world wide physiological anemia 6-18 mos
Marrow Hyperplasia		most severe of any anemia	confined to the skull
Cranial vault	hair-on-end uncommon, symmetrical thickening of parietal less often frontal and occipital bones, thickening of orbital roof	hair-on-end most common change, marked vault thickening, earliest in upper part of frontal bone, and orbital roof	50% have changes in occipital bone, widening of diploe, thinning of outer table of frontal and parietal bones, thickening of orbital roof
Facial bones	radiolucency of mandible	**maxilia, sphenoid expanded, failure of pneumatization of maxillary, sphenoid and mastoid sinuses,** "rodent" facies of laterally displaced orbits, malocclusion and dental displacement	pneumatization may be abnormal (38%-50% patients)
Ribs	coarse trabeculae from diffuse sclerosis	widened, thin cortex, honeycombed trabeculae, "rib within a rib", notching of upper and lower margins, **bulbous expansion of posterior segment**	
Long bones	earliest changes in hand-foot bones < 2 yrs and up to 6 yrs, medullary cavity expanded, enlarged vascular foramina	earliest changes in small bones of hands-feet, thin cortex, expanded marrow, thickened trabeculae, enlarged nutrient foramina in phalanges	widening of marrow, thinning of cortex, marked osteoporosis in distal end of humerus, enlarged nutrient foramina in the phalanges
Growth Disruption			
Vertebra	Most commonly involved portion of skeleton, see osteoporosis, **"step deformity" of the central end-plate**, 30% vertebral cupping	demineralization,decreased height, increased width, biconcave end-plates or "fish vertebrae"	osteoporosis

Table 1.3 (cont'd). Skeletal Changes in Three Kinds of Anemia

Type of Anemia	Sickle Cell	Thalassemia	Fe Deficiency
Long bones		Erlenmeyer flask deformity of femur, loss of contour	
Epiphyses	symmetrical infarction of femoral capital epiphysis and proximal humerus epiphysis, delayed closure, epiphyseal shortening	premature fusion of segment of epiphyseal line in homozygous, esp of prox. humerus and femur >age 10	
Bone infarction	**punched out lesions in end of long bone,** "bone-within a bone" in long bones of adults		
Infection	sequelae to infarction: osteomyelitis of long bones, joint effusions, septic arthritis		

Adapted from Resnick (1981) with additional data from Moseley (1974), Lawson (1981, 1984), Steinbock (1976), Stuart-Macadam (1992), Ortner and Putschar (1981). **Bold** items are pathognomonic for the disorder.

> "It has become apparent that factors such as ecology, hygiene, aggregation, disease, and the role of iron in the body's defense system are of far greater importance than diet in producing iron-deficiency anemia and porotic hyperostosis. All these factors ultimately affect the total pathogen load of a population, which is the key to the occurrence of iron-deficiency anemia in past human populations" (Stuart-Macadam 1992:166).

In this new interpretation, the presence of cribra orbitalia and porotic hyperostosis are indicators of an adaptation to a parasitic stress, rather than an indication of illness or failure of adaptation (Stuart-Macadam 1992). The complexity of the interaction is underscored (Palkovich 1987).

Oral Health

The condition of the dentition and the oral cavity provides important data for interpreting the diet, nutrition, food preparation, health, disease, and some cultural practices of the population (Lukacs 1989). Not only are the teeth typically well preserved in archaeological populations, but a great deal of information can be quickly and efficiently collected. The primary or deciduous teeth provide a record of the development of the child during the prenatal as well as early infancy period, while the permanent teeth overlap that time period, and extend throughout adulthood. Oral health may be affected by a multitude of factors including type and constitution of the diet, disease, age, sex, ethnicity, as well as cultural requirements on the teeth, making inferences on etiology, or causative factors for change over time difficult.

The prevalence of most of the dental pathologies increases with the transition of subsistence economy in human populations from hunting and gathering to agriculture (e.g. Cohen and Armelagos 1984, Lukacs 1989). A relative decrease in tooth and jaw size is also evident in human evolution through these transitions (Brace et al. 1991). The most common dental pathology used for spatial and temporal comparisons in skeletal populations, and reconstruction of subsistence, is caries. Caries, "a progressive demineralization of the tooth caused by localized fermentation of food sugars by the bacteria in dental plaque" (Lukacs 1989:265), is known to be associated with a diet high in soft, sticky and sweet foods.

Caries are age-related pathology because of the time it takes for demineralization of the enamel and formation of the defect. They are also intimately tied to the morphology and location of the tooth: thus, the fissures of the occlusal surface of the molars easily catch and hold food items, as do the interproximal spaces, and the posterior location of these teeth make them more difficult to clean. Caries are not common on the smooth surfaces of the incisors and canines, which are self-cleaning. The degree and rate of dental attrition also affects the prevalence of caries, with rapid loss of the fissured surface of the molar crowns, the primary location for caries formation is lost. Comparisons of caries prevalence must be evaluated according to the age structure of the population, as well as the rate of dental wear.

A second dental pathology is abscessing, which may have two causes: exposure of the pulp chamber through advanced wear which then results in infection and inflammation of the apex of the root; and advanced periodontal disease resulting in abscessing at the alveolar rim (Lukacs 1989). Clarke (1990) would say that the only cause of abscessing is pulp infection, which typically results when severe attrition exposes the pulp chamber, but may also occur in the presence of an intact crown. He proposes four kinds of defects: 1) furcation defects (most prevalent in first molars because of attrition) 2) angular defects 3) lateral defects 4) apical lesions. These localized defects are responsible for tooth loss. The periapical abscess may be noted on radiograph, but more commonly is recorded because of expansion through the cortical bone of the jaw. Dental abscessing may be a cause of systemic infection, osteomyelitis, rheumatic fever, and possibly death, and also may result in considerable disability in mastication because of pain and tooth loss.

Premortem tooth loss, or loss of teeth through caries, abscessing, or periodontal disease, may be used to infer the degree of severity of the causal agent as well as the relative stress in older individuals in the population (Lukacs 1989). Extensive tooth loss, pain, swelling, and infection may significantly interfere with normal nutrition and hydration, contributing to early death.

Two indicators of periodontal disease, or infection of the dental soft tissues, are observable in skeletal remains: calculus and alveolar resorption. Mineralized dental plaque, or calculus, which forms on the tooth and root surface near the gum line, may act as an irritant and result in inflammation of the gums, or periodontitis. Typically, calculus is formed on tooth surfaces which are close to the salivary gland outflow, such as the mandibular incisors and all molars. Calculus is rarely found on the occlusal surface of the teeth or on the labial surface of the anterior teeth because of the mechanics of biting and chewing and the easy presentation for cleaning of these teeth. Brothwell (1981) proposed a slight, medium and marked scoring system.

The individual teeth are tightly held by the alveolar bone of the maxilla and mandible. This bone is typically dense cortical bone with a smooth surface which fits right up against the tooth root. In the presence of inflammation of the gum tissue, the alveolar bone exhibits "porosity, periostitis, and resorption along the alveolar margin" (Lukacs 1989:271). Although this definition of alveolar resorption is correct, in most older studies, the method of recording resorption is based upon the amount of tooth root exposed above the alveolar rim (e.g. Brothwell 1981, Lukacs 1989, Bass 1987), without regard to the actual appearance or quality of the cortical bone. Recently, Clarke (1990, 1993) has argued that since the teeth continue to erupt from the alveolar bone through adulthood, and that the old technique merely measured the amount of this eruption. Thus, older studies report high degrees of alveolar resorption which are not truly present. Periodontitis is defined as a loss of the alveolar cortical bone crest manifested by a decrease in the density of the cortex, revealing the cancellous interior (Clarke 1990, 1993; Clarke and Hirsch 1991, Clarke et al. 1986). The resultant porosis may be scored on a slight (evidence of porosity), moderate (more advanced porosity), and marked (periostitis, macroporosity) scale. Although alveolar resorption is not a primary cause of premortem tooth loss, the inflammation and loss of the alveolar bone may contribute to pulpal infection (Clarke 1990).

As stated above, the pattern and especially the rate, of dental attrition is vital to interpretation of the prevalence of dental caries and abscessing. Dental attrition may also be used to reflect subsistence base, when assessed in relation to the available diet, food processing techniques such as grinding and cooking. It is generally believed that hunters and gatherers are eating a coarser, unprocessed diet of nuts, roots, etc., than a sedentary agricultural community which is reliant on soft grains, husking and grinding, etc. However, the grit which is often added during the grinding phase may result in an increase in dental wear. Microscopic evaluation of the type and direction of wear markings on the tooth have been used to propose patterns of tooth use. Methods of scoring dental attrition range from very broad systems - young, middle-aged, old; to highly specific (e.g. Scott 1979a, 1-40 system).

Cultural alterations of the teeth, known in skeletal populations throughout the world, may also act as stressors by disrupting the normal biomechanics of the mouth, or acting to increase other pathologies. Deliberate extraction or ablation of the teeth may affect the mechanics of chewing or biting; filing of the teeth may expose the softer dentin or pulp which is susceptible to infection.

Osteoarthritis

The structures of a joint have a limited capacity to express change, thus, different disease processes may produce similar morphological appearances (Rogers et al. 1987:179). Changes may be proliferative or destructive, and should be distinguished. Rogers et al. propose a system of analysis using a flow chart approach beginning with the nature of the bone lesion (proliferative vs destructive), the pattern of distribution (i.e. joints affected), and radiographic findings. With the determination of these factors, the lesion can be classified according to one of five major groups of bone change (Table 1.4).

Osteoarthritis is by far the most common change in the skeleton, and may be defined by the presence of eburnation, which is pathognomonic, and in the absence of eburnation, at least two of the following: 1) marginal osteophyte, 2) deformation of normal joint contour, or 3) pitting or new bone formation on the joint surface (Rogers et al. 1987, Waldron 1992). These osseous changes are difficult to equate with the medical definition of osteoarthritis, because changes which are obvious to the skeletal biologist are likely not to be reflected in a radiograph.

While patterns of osteoarthritis within a population have long been examined for occupational inference, it would seem that this is a futile exercise (Waldron 1992, 1994). However, the joints affected and degree of severity of degenerative osteoarthritis can help illuminate the stress and strain of the daily life of the population in question, as well as suggest factors of genetic composition in the age at advent, and severity (e.g. Waldron 1992). Attention to the pattern of joints affected (and unaffected) and population distribution has resulted in projection of occurrence of rheumatoid arthritis back in time (Woods and Rothschild 1988).

Table 1.4. Classification of Arthropathies

Bone Change	Morphology and Joints Affected	Probable Classification
Proliferative	Eburnation, Cysts, Pitting Changes in joint contour Marginal osteophytes in spine	Osteoarthritis
	Vertical osteophytes on right anteriolateral thoracic spine At least three contiguous vertebrae fused Normal disc space, normal facet joints Extraspinal ossification (i.e. patella, calcaneus, iliac crest)	DISH
Erosive	Monoarticular Asymmetrical First metatarsophalangeal joint, or ankle, knee, shoulder Within joint, para-articular erosions, sclerotic edges, overhanging margins	Gout
	Symmetrical polyarticular Erosions or cysts Smooth rounded lesions with smooth trabeculae Hands: proximal interphalangeal, metacarpophalangeal Feet: metatarsophalangeal joints	Rheumatoid Arthritis
	Asymmetrical polyarticular Sacro-iliitis, Knee Contiguous spinal akylosis	Ankylosing spondylitis
	Asymmetrical polyarticular "Pencil-and-cup" erosion of feet	Psoriatic arthritis

Source: Rogers et al. 1987.

While osteoarthritis patterns have not been that helpful in supposing occupation (Waldron 1994), it is suggested that certain "marks" of the skeleton, for example, the placement and extension of certain articular surfaces or facets, may shed light on repetitive activities. The squatting facet is perhaps the most widely known of these "occupational stress indicators", but many others have been proposed, with greater and lesser acceptance (Kennedy 1989; Merbs 1969). Although many of these indicators are systematically scored as non-metric variation (e.g. costoclavicular sulcus, squatting facet); others are identified from systematic scoring of the articular facets (Molleson 1994).

Trauma

Evidence of traumatic injury provides information on the relative risk of daily life to the individual, and allows reconstruction of trauma-producing behaviors (Merbs 1989). Population studies of trauma have suggested the absence of warfare (Lovejoy and Heiple 1981, Roper 1969), the presence of warfare (Walker 1989, Keeley 1996, Jurmain 1991), and provided inferential evidence of the level of medical knowledge (Roberts 1988, 1991). Fracture rates have been noted to decline over time in American Indian populations (Steinbock 1976), as a result of a more sedentary lifestyle. While healed bone fractures are typically the most common finding; peri-mortem trauma (trauma at or around the time of death), scalping, amputation, dislocation, sprain, and medical procedures such as trephination, may also be identified (e.g., Gregg and Gregg 1987). Perimortem trauma, or bone fracture caused at or around the time of death which may or may not have been the cause of death, is difficult to distinguish from breakage occurring after interment of the body or during post-depositional disturbance. Comparison of trauma between populations is difficult because of incomplete descriptions, and a variety of recording and recording procedures (Jurmain 1991, Roberts 1991).

Often healed fractures are merely observed, rather than being described in detail, including the exact location of thickening or callus formation, evaluation of the element in two dimensions (i.e anterior-posterior, and medial-lateral) for evidence of shortening, rotational, or longitudinal deformity, radiographic interpretation in two views, and photographic documentation (Roberts 1988, 1991). With these components, an evaluation of the likely cause of the fracture can be made based upon the substantial clinical literature on bone fractures available (e.g. Key and Conwell 1937, Rockwood and Green 1975, Rang 1983), as well as a suggestion of the level of personal hardship.

Traditionally, only complete long limb bones, or complete skeletons, are included in trauma surveys (e.g. Lovejoy and Heiple 1989, Jurmain 1991), with fractures reported as "per individual" or "per element". However, in the case of poorly preserved, incomplete skeletons, and small sample sizes, use of even complete elements may be impossible. In these cases, an identified fracture in a long bone fragment may be the only observation and can make a great deal of difference in conclusions about trauma.

In an effort to mitigate these effects, a bone element inventory, incorporating five components to each of the long limb bones: proximal epiphysis, proximal, middle and distal diaphysis, and distal epiphysis, has recently been recommended (Buikstra and Ubelaker 1994). This inventory also serves to handle the problem of identifying fractures in incomplete skeletal elements.

Infectious Disease

> "Perhaps more than any other category of disease, infectious disease offers the skeletal biologist insight into the interplay of disease, diet (including weaning practices), ecology, social structure, settlement pattern, plant and animal domestication, warfare, sanitation level, immunological resistance, and psychological stress" (Kelley 1989:191).

Contributions on all of these topics have been made by skeletal biologists analyzing evidence of infectious disease in human skeletal populations worldwide and over time. Many of the more common infectious diseases of the modern world are dependent upon large population aggregates for longevity and transmission (e.g. hepatitis, dysentery, smallpox, measles, flu, cholera, etc.). Other infectious diseases are transmitted from animal/insect vectors, both wild (e.g. ebola, tularemia, schistosomiasis, etc.) and domestic (anthrax, brucellosis, psittacosis, bovine tuberculosis, etc.). Parasitic diseases such as malaria and intestinal protozoa, increase with landscape change and domestication.

However, while infectious diseases are likely to have been the primary mechanism of mortality in earlier times, especially in infants and children, very few infectious diseases leave lasting, pathognomonic marks on the skeleton (Steinbock 1976, Ortner and Putschar 1981). Acute, epidemic infectious disease results in either death or recovery prior to involvement of the skeleton.

Bone responds to infection in three ways: either bone is made (osteoblastic), bone is lost (osteoclastic), or the two occur together. Infections involving the outer cortex of the bone are typically osteoblastic, and are called "periostitis or periosteal reactions", and are described as "porous fiber bone", or "reactive" bone, which is initially formed on the cortical surface of the bone. Advanced infections involving the marrow cavity are called "osteomyelitis", these are both osteoclastic and osteoblastic infections, and include large scale periostitis, with the formation of a new bone mass (involucrum), fragments of old dead bone (sequestrum), and the presence of cloaca or drainage openings (Steinbock 1976). While osteomyelitis is the more dramatic of the two bone infections, periosteal reactions are by far the most commonly found indicators of infection in archaeologically derived skeletal collections (Larsen 1987, Ortner and Putschar 1981).

These bony changes have traditionally been described as "non-specific" or "specific" (Steinbock 1976), relative to the ability to diagnose the causative agent. "Specific" bone infections describe those few instances where a known infectious disease leaves an identifiable pattern of osseous changes: the classic diseases are tuberculosis and treponemal disease (Steinbock 1976). The appellation "non-specific periostitis" has recently been challenged as a non-entity by Rothschild and Rothschild (1996). Using the same population-based, pattern recognition method of analysis applied to evidence of rheumatoid arthritis, several investigators (Rothschild et al. 1988, Woods and Rothschild 1988, Rothschild and Heathcote

1993) suggest that cases of non-specific periostitis found in Amerindian skeletal remains are actually indicators of treponemal disease.

Documentation of infectious disease in a skeletal population suffers from a lack of systematic scoring by skeletal element, and complete and detailed description. These problems are complicated by the use of terms which are poorly defined and poorly understood, or terms borrowed from medicine but which don't have a skeletal component (Ortner 1991). The paleopathologist is able to see early bone changes in skeletal material which have no corresponding component in clinical medicine simply because they are not recognizable on radiograph. These difficulties have contributed to the accumulation of a morass of "case study" descriptions of isolated pathologies, which are difficult to correlate and compare. As noted above, the use of a "population" approach: looking for patterns in the occurrence of lesions, in the skeletal elements affected, and the age, sex, rank, etc. of the affected individuals; may improve the diagnostic ability of the paleopathologist (e.g. Rothschild and Rothschild 1996).

Summary of the Indicators of Stress

In summary, the generally accepted indicators of health and disease in skeletal populations as reviewed above (paleodemography, growth, dental enamel hypoplasia, cribra orbitalia and porotic hyperostosis, dental pathologies, degenerative osteoarthritis, trauma and infection) will be utilized to provide baseline data on the physical condition of the ancient inhabitants of northeast Thailand. While it is understood that these are, by no means, the only or definitive indicators, and recognizing the omission of evidence available from microscopic and destructive studies of the bone, beginning the process of defining and describing these skeletal populations is the primary goal.

In addition to the indicators of health and disease discussed above, there are other abnormal or pathologic conditions which may influence the lifeways of a population and give inference to general health. Congenital defects, tumors, et al., can and do occur in human skeletal remains, but these are typically isolated, rare, or uncommon, thus restricting our ability to draw conclusions, and utilize them in comparisons and in reconstructing population health. This does not discount the probable effect on the living person, and does not preclude the introduction of evidence in these skeletal samples for rarer things.

MAJOR QUESTIONS

The aforementioned indicators of health and disease have been used to document variation with the progression of human subsistence and settlement patterns from the itinerant hunter-gather, seasonally sedentary hunter-gather-cultivator, settled agriculturalist, to urban dweller. This variation is systematic enough, in a variety of geographical areas with common subsistence and technological patterns, to become accepted theory (e.g. Cohen and Armelagos 1984). The association of an increase in caries frequency and decrease in dental attrition with the increase in processed, starchy foods of agriculture, is such that caries frequency has been used to propose the economy in areas where there is no other evidence (Lukacs 1989, 1992a). These same indicators have been used to document the dramatic and catastrophic decline in health experienced at the contact period between the West and a variety of indigenous peoples (Larsen and Milner 1994, Verano and Ubelaker 1992).

The majority of research has taken place on Amerindians (South and North America), Pacific Islanders, and early Europeans. Notably missing from these collections is data from the tropical and monsoonal environments of Southeast Asia. This absence is likely related to several factors: the relatively recent archaeological focus in the region, the volume of literature in languages other than English, sparse human skeletal collections from the region, and lack of focus on the area by physical anthropologists. This dissertation is designed to begin to address this vacancy. The earliest skeletal collections in Thailand are from populations that already have metal, domesticated animals, and are semi-sedentary cultivators. Unfortunately, skeletal remains in the nomadic Hoabinhian period are largely lacking.

The primary research problem for this dissertation is: What was the health status of the premetal, early bronze and early iron age inhabitants of northeastern Thailand and how did it change over time? Two hypotheses can be generated based on available evidence in other parts of the world for neolithic and metal age human skeletal populations.

Hypothesis 1: Early inhabitants of Thailand were generally healthy.

In northeast Thailand, late premetal age people moved down from the highlands to settle in small villages along the stream tributaries, with continued reliance on the highland forest resources. This access to diverse resources acts as a buffer against the vagaries of the environment, especially the monsoonal climate, which affect the food supply. Rice was likely to have been cultivated using an expansion of the natural wild rice habitat *via* fire or clearing (White 1986). Landscape change associated with this activity may have resulted in an increase in available mosquito habitats, resulting in an increase in exposure to potential malaria vectors; as well as a change in the fauna available at close proximity to the settlement. There may also have been an increase in exposure to zoonoses with the keeping of domesticated animals (Fiennes 1978), and perhaps an increase in bacterial and vector habitats for such diseases as schistosomiasis (Chaowagul et al. 1989).

The test implications for Hypothesis 1 would include the absence or low occurrence of individuals with infectious diseases and trauma, and low levels of the non-specific skeletal stress indicators such as enamel hypoplasias. The presence of hemoglobinopathies [genetic blood diseases which offer resistance to malarial infection (Kruatruchu et al. 1978)] in modern northeast Thailand suggests a long-standing relationship with malaria. This modern health problem, along with endemic malaria (Bruce-Chwatt 1985, 1988), provide a crucial link with the past, helping to suggest possible prehistoric diseases, as well as raising questions as to the temporal origins of these modern problems.

Hypothesis 2: There is a decline in health over time.

There appears to be ample archaeological and skeletal evidence in many parts of the world that argues for a decline in health following agricultural intensification and population increase (Cohen 1988, Cohen and Armelagos 1984). This decline in health is intimately related to the hazards of "domestication" (Higham and Maloney 1989), sedentism, or stationary habitation: increased sanitation problems, increased population density, land ownership with subsequent warfare to defend that ownership, etc. Agricultural intensification in northeast Thailand, occurring around 1000 - 500 B.C., involves a change from rice cultivation to rice agriculture (e.g. digging canals, plowing, transplanting, etc.) which is linked to the introduction of iron, use of the water buffalo as a traction animal, and wholesale landscape change (Higham and Kjingam 1979). This new technology allowed human settlements to move out onto the alluvial plains, a move which results in less access to the resources of the highlands, an increased emphasis on rice as a staple crop, increased trade, and an increase in settlement size and population density.

The test implications for this hypothesis might include the appearance of population density-dependent infectious diseases, such as tuberculosis. An increase in trauma, a general increase in the occurrence of skeletal stress indicators, a decline in stature or long limb bone length, an increase in dental caries associated with a rice-dominated diet (Huss-Ashmore et al. 1982, Klepinger 1992), and an increase in malaria, or the appearance of the hemoglobinopathies, all may reflect a decline in health. However, the skeletal evidence of iron deficiency anemia of nutritional stress, parasite load, malaria or the hemoglobinopathies (Caffey 1937) are complex and may not allow a differentiation.

PREVIOUS RESEARCH

Skeletal biological research of any kind on prehistoric human remains from Thailand is limited to a relatively few samples, ranging in age from 3600 B.C. to 1000 A.D, and primarily from the northeastern section of the country. There is a large amount of literature on human skeletal remains from Thailand, written in the Thai language, and detailing small projects, isolated finds, or "in situ" observations of skeletal material (e.g. Sangvichien and Subhaven 1981) that was not accessible to this author. This discussion will generally focus on the more accessible published literature in the English language. Summaries of the previous Non Nok Tha and Ban Chiang analyses are deliberately abbreviated since the focus of this dissertation is a reexamination of these remains. The majority of the early analyses are descriptive in nature, attempting to initialize a database on the morphological characteristics of the ancient Thai people, and are not directly examining or interpreting skeletal indicators of stress.

A small sample of human remains (N=38) was recovered from Ban Kao, in western Thailand, by a Thai-Danish expedition (Sangvichien et al. 1966, 1969). Systematic data collection in this series was limited to measurements and eight non-metric traits recorded in the skull and measurement of the long limb bones for the calculation of stature. Pathologies noted: A compression fracture of the first lumbar vertebra in an adult male; deliberate ablation of the maxillary lateral incisors and canines in five individuals, the youngest was 18 years; abrasion of the labial surface of selected teeth in three individuals, a possible case of trepanation, two carious teeth, and cranial vault thickening in seven crania. The late Dr. Sangvichien, an anatomist, regarded the evidence of cranial vault thickening in at least one individual to be indicative of thalassemia (Sangvichien et al. 1969:34).

The first large skeletal sample from Thailand was derived from the two seasons of excavation at Non Nok Tha. The summary report on the 1966 excavation at Non Nok Tha (Pietrusewsky 1974a) and another paper detailing the paleodemography at the site (Pietrusewsky 1974b) serve as good documentation of these skeletal remains. In the 1966 summary, observations of dental pathologies (abscessing [15.7%], caries [26.0%], attrition [advanced 12.0%] and minimal premortem tooth loss) and osteoarthritis were systematically collected. Cranial vault thickening and porotic hyperostosis are reported in over half of the adult skulls, with thickness measurements ranging from 8 to 11 mm. The first case of possible tuberculosis in prehistoric remains from Thailand is described in an old female. The third through ninth thoracic vertebrae are fused into a solid mass with approximately 90° of kyphosis. The Non Nok Tha data were also compared to other Asian skeletal series using multivariate statistical techniques to examine their biological origins; however, the sample was isolated and no conclusions could be made.

The 1968 Non Nok Tha skeletal sample summary by Brooks and Brooks (1987) is disappointing in its lack of detail and limited scope. While metric and non-metric data were collected on the skull and infracranial skeleton, only selected indices are reported, omitting the basic inferential statistics on the individual bone measurements (e.g., mean and standard deviation of the maximum length of the femur). The failure to report frequency data for observations on the dentition, makes the data completely useless for comparative purposes.

The paleopathology section of the report omits osteoarthritis, and lists the pathologies, such as "enlarged ischial spine", without any kind of description or differential diagnosis. Some comparisons with the earlier Non Nok Tha series were attempted, but again, these suffer from a lack of frequency information. A paper dealing with the paleopathology of the series (Brooks and Brooks 1983) was presented at the Pacific Science Congress, but never published, although a volume was devoted to the session (Bayard 1984a).

Among the paleopathologies noted are two individuals with poorly healed clavicle fractures, two individuals with "swollen" tibias, a variety of exostoses, a paracondylar facet, and an ankylosed second and third cervical vertebrae. Dental pathologies described include one individual with a caries, marked alveolar resorption in 33 individuals, and no abscessing. The marked resorption is interpreted as indicative of betel nut use. No cases of cribra orbitalia or porotic hyperostosis were noted. Final conclusions suggest the Non Nok Tha skeletal series "was relatively free from serious pathologies" (Brooks and Brooks 1987:21).

The 1968 Non Nok Tha series has also been utilized in two Master's theses, one recording Harris lines (Crownover 1984), and the other testing sex and ethnic discrimination using mandible measurements and observations (Stevens 1982). Crownover radiographed femora from 32 individuals, documented from 1 to 18 Harris lines in 30 individuals, giving a mean number of growth arrest lines per individual of 4.6.

The first skeletal sample to be analyzed specifically for indications of "health and disease" was a sample of 73 individuals, recovered from Ban Na Di, northeast Thailand (1400 - 400 B.C.), analyzed by Wiriyaromp (1984a, 1984b). This analysis reports data collected on age, sex, radiographic evaluation of the cortical thickness in the metacarpals and Harris lines in the long limb bones, stature calculations, and brief descriptions of dental and skeletal pathology. Pathologies included a healed fracture of the first metatarsal, and a midshaft tibial swelling; three individuals with caries, two individuals with abscesses. The population was declared to be healthy based on a general absence of paleopathologies, tall stature, good cortical thickness bone formation, and good dental health. While this was a good effort, no information on osteoarthritis was gathered, and though dental enamel hypoplasias were scored, they were not described or measured, and there is a distinct lack of frequency data (i.e. affected/observed).

Two seasons of excavation at Ban Chiang, northeast Thailand, yielded 111 human skeletons, also examined by Dr. Pietrusewsky (1982, 1984), who collected a large series of skeletal metric and non-metric data, including dental measurements and non-metric variation, dental pathology, osteoarthritis, and skeletal pathology. Descriptions of the pathologies include porotic hyperostosis, fractures, cranial trephination, and long limb bone "swelling". Temporal comparisons of the early and late phases at the site showed no significant differences. Multivariate and distance studies of the Ban Chiang data, using the Non Nok Tha (1966) skeletal series and other Asian, Southeast Asian and Pacific populations, demonstrated no evidence of a population influx, and showed some relationship with other geographically close populations. The Ban Chiang skeletal series (especially the crania) has been utilized by other researchers examining the origin and dispersal of humans in the Pacific region (e.g. Turner 1990, Brace et al. 1991, Hanihara 1992).

Pietrusewsky (1986) examined a small sample of skeletons (N=19) recovered from Non Pa Kluay, northeastern Thailand, dated between 2000 B.C. and 200 B.C. Cranial and infracranial measurements and non-metric observations, as well as dental pathology, porotic hyperostosis in five of seven adult crania, and minimal osteoarthritis are reported. There were no observations of trauma, infection, neoplasm or congenital malformation in this series. Brief comparisons of the demography and major indices of morphology with other skeletal series were presented.

Finally, the most recent work on indicators of stress in Thai skeletal remains has been conducted by Nancy Tayles (1992) at the University of Otago, Dunedin, New Zealand. She did a detailed examination of 154 skeletons from the coastal and riverine settlement of Khok Phanom Di, Thailand (B.C. 1500 - A.D. 500). Initial findings at this site include a high infant mortality rate in the early occupation, the presence of chronic anemia in a majority of the individuals, as well as possible thalassemia; with a change to high childhood mortality co-incident upon well documented environmental change (Higham et al. 1992, Tayles 1992). The Khok Phanom Di skeletal remains will provide a valuable and interesting comparative sample, from a completely different ecological setting, for the results obtained in this research project. This series also provided thesis data for Choosiri (1988), who summarized the skeletal series.

CHAPTER 2. THE RESEARCH SAMPLES

The best sources of data to answer questions about past health and disease in northeast Thailand are the human skeletal samples from Non Nok Tha and Ban Chiang. These two sites, the first large scale joint projects by Thai and United States researchers in Thailand, were excavated in the late 1960's and mid 1970's respectively. Both are located on the northern part of the Khorat Plateau, a region bounded on the north and east by the Mekong River, and on the south by two ranges of mountains (Petchabun and Dong Raek), and subject to marked seasonality in climate (Figure 2.1). The "plateau" is actually two basins: the Khorat and Sakon Nakhon, which are drained by the Mun River and its two tributaries, the Chi and Phong, and the Songkhram River, respectively. The rim of the Khorat basin is formed by three layers of exposed sedimentary rock, primarily varieties of sandstone, which are a known source of lithic material for the early inhabitants. Non Nok Tha is located in the Phu Wiang region of the western plateau, near low terrace ridges at the junction of two streams along a tributary of the Chi River, while Ban Chiang is located near the confluence of three tributaries of the Songkhran River, in gently rolling lowlands. In the absence of environmental reconstructions of the areas, the two sites are presumed to share broadly similar environments. The use of these two skeletal series from similar time periods, will significantly increase the available sample size, therefore improving the validity of the conclusions, as well as allow the evaluation of similarities and differences in evolutionary patterns.

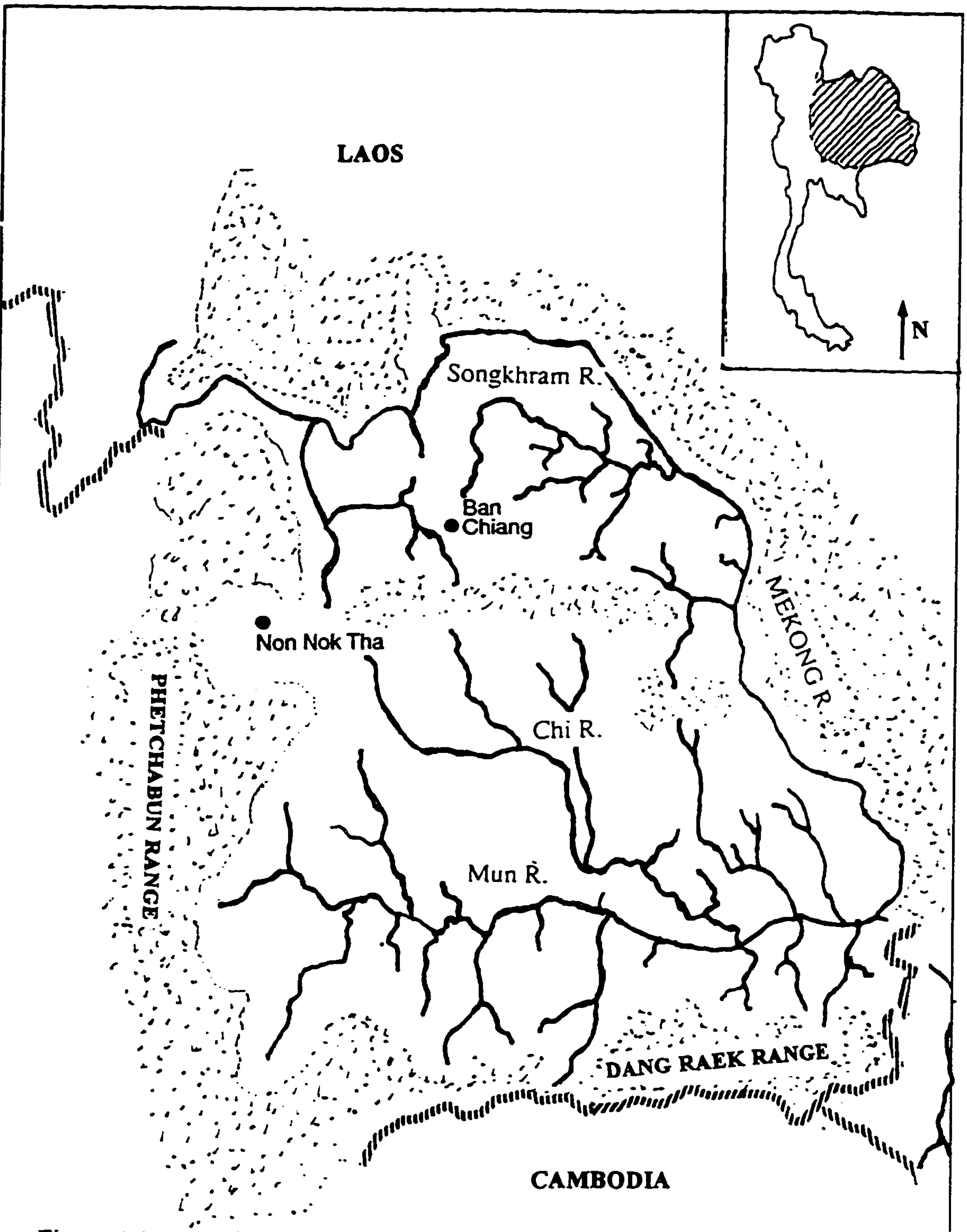


Figure 2.1. Location of Non Nok Tha and Ban Chiang in Northeast Thailand

NON NOK THA

Archaeological investigations at Non Nok Tha began in the early 1960's as salvage explorations prior to dam construction and development of the Mekong River Valley for water management (Figure 2.1). In 1963, The Thai Fine Arts Department-University of Hawai'i Archaeological Salvage Program, under the direction of Dr. Wilhelm Solheim III, began a three year program of survey and test excavations in northeast Thailand, where the first dams on the Mekong were to be built. In the first season, twenty-one sites were located, in three reservoir areas: Lam Phra Phloeng, Lam Pao, and Nam Phong. Three sites in the Nam Phong (NP) impact area were tested for depth of deposits in the second season and NP-7 was chosen for a major excavation in the third year.

Excavations at NP-7, a one hectare mound rising (80-150 cm) from the rice paddy fields near the modern village of Ban Na Di, began in 1965/66 under the direction of Dr. Solheim and Mr. Donn Bayard of the University of Hawai'i, and Mr. Hamilton Parker of New Zealand. During the course of the excavation, it was discovered that the local villagers had a name for the mound: "Non Nok Tha" or Partridge Mound, so this name came to be the designation commonly used for the site. In the first season, a total area of 150 m^2 was excavated close to the center of the mound, and 85 burial features were identified (not all of these contained skeletal material or were completely excavated). The human skeletal material recovered was curated at the Department of Anatomy, Mahidol University Medical School, Siriraj Hospital, Bangkok under the direction of the late Dr. Sood Sangvichien.

In 1968, D. Bayard returned to Non Nok Tha to initiate a second excavation to the north of the 1966 excavations, forming the basis of his doctoral research. In these excavations, 189.5 m^2 of cultural deposits were removed, with a total of 125 burial feature numbers assigned (again, not all of these contained human skeletal material). The human skeletal remains recovered were forwarded for curation and analysis to Dr. Sheilagh Brooks of the University of Nevada-Las Vegas.

The final report of the Non Nok Tha excavations is pending publication, but the majority of the ensuing discussion is taken from the manuscript (Bayard and Solheim in press) and other publications as cited. Unfortunately, the two excavations could not be connected by a trench for absolute co-ordination of the stratigraphy. The stratigraphy and chronology of the site are also complicated by the absence of some of the levels in both excavation areas due to erosion and pattern of use. Only 3.1% of the area of the Non Nok Tha mound was excavated, but the two spaced excavations suggest that there was differential use of the mound area through time.

Excavations during both seasons at Non Nok Tha, were conducted within the excavation zone only, i.e. if the feet of a burial extended into the designated area, the feet were excavated and nothing more. There was significant burial intercutting and subsequent commingling of remains, including the apparent deliberate inclusion of miscellaneous human bones in burial mounds. Many of the skeletal elements had heavy mineral concretions, and in some cases preservative was applied to skeletal remains *en bloc*. In addition, the character of the soils at Non Nok Tha prohibited screening and likely resulted in the loss of many of the small bones of infants and children, and the smaller bones of the adult skeleton, such as the distal phalanges. Still, many of the skeletons were substantially complete and preservation overall is fair to good.

Environment

Three landforms exist near Non Nok Tha: mountains, alluvium and rolling terrain. The mound of Non Nok Tha is located in the rolling lowlands which range from 180-210 m in elevation and are crossed with seasonal watercourses. There are only three permanent watercourses nearby: the Nam Phong, Lam Phaniang and Huai Bong/Huai Khaen. The mountains are only 2-3 km from Non Nok Tha and include triple layer rain forest. Water is unpredictable in this region, due to the shadowing effect of the Phetchabun Mountains (1375 mm mean annual rainfall), and evidenced in the few perennial streams, and the need for the Mekong River Valley project. There are typically three seasons: a cool season from November-February (17°-31° C), hot season of March and April (22°-36° C) and the May through October rainy season (24°-33° C).

Bayard (1971, Bayard and Solheim in press) proposes that the environs of Non Nok Tha provided a variety of resources to a population with beginning "wet-rice" technology: the mountains supported limited hunting and gathering, the rolling lowlands allowed inundation rice cultivation, and swampy areas around the perennial streams provided wet-rice capabilities. Seven local resource zones are proposed based on personal observations of the current environment surrounding the modern village (Table 2.1). There is no question that the modern landscape is significantly changed from that which existed in the Early Period at Non Nok Tha, with the transformation of the alluvial plains into rice paddies, but sourcing studies of the excavated stone tools and the presence of numerous mammal and fish bones, suggest that the early inhabitants of the site availed themselves of the proximate resources. Even today, the modern villagers of Ban Na Di are "recreational hunter-gatherers", collecting edible plants and animals in the course of tending to the rice paddies, gardening and travel (Bayard and Solheim in press).

Table 2.1. Resource Zones of Northeast Thailand

Zone	Location (Elevation above sea level)	Resources
1	**River bottomlands** (175-205m): immediately adjacent to permanent water.	Fish, Yang trees, aquatic plants/vegetables, and timber
2	**Ricelands** (180-215m): wet-rice paddies and dikes. Rice and grasses with small trees growing on termite mounds.	Rice, as well as jute, cotton, banana, mulberry, pepper, mango, papaya, cabbage, onion, beans, rice crabs, fish, lizards, frogs, and insects.
3	**Uplands** (190-210m): separating zones of paddy cultivation. Small trees and heavy shrub undergrowth. Bare stony areas occur.	Dry crop cultivation, including jute, kenaf, timber, also sources of iron, and stone.
4	**Foothill Forest** (200-230m): Base of mountains, increased vegetation because of runoff, primarily short thorny bamboo.	Small game, medium timber.
5	**Mountainside Forest** (230-500m): Smaller trees and less brush than foothill forest.	Medium to large game.
6	**Mountaintop Forest** (500-600m): Triple-layer forest with large trees (>30m) and heavy undergrowth. Occasional open clearings.	Medium to large game: langurs, monkey, giant squirrel, pangolins, monitor lizards, gibbons, wild pigs, deer, civet, loris, bears and birds.
7	**Village**: near workable rice paddies, with economic value plants.	Garden products as above, domesticated animals: cow, pig, dog, ?chicken.

Source: Bayard and Solheim (in press).

In addition to these local resources, evidence that trade networks are established by the initial use of Non Nok Tha as a burial area, is surmised from the recovery of exotic shell beads, and adzes of non-local stone as burial goods. The nearest source of ore for the manufacture of bronze is 50 km to the northwest, so it is also likely that the metal was traded in as ingots of copper and tin, or as the finished alloy.

Village Life

Although little evidence of habitation structures or living surfaces was found at Non Nok Tha, archaeological excavations elsewhere, have suggested that the ancient villages look much like the modern ones (Higham 1989). Built on high ground with surrounding space for growing gardens and keeping animals, the houses were wooden and thatched structures, elevated from 1.5-2m off the ground on wooden posts. Cooking may have been done on "porches" attached to the house, or on the ground beneath. Perhaps pens for animals were made using the house supports. Evidence recovered at Non Nok Tha showed spatial variation in the use of the mound, suggesting localized production of pottery and bronze casting, as well as designated burial areas.

Pottery from the excavations had a variety of tempers (n=11) and decorations (n=12) and provided the most reliable data for typing and sequencing the site. Six classes of vessels were identified which were mutually exclusive, but within each, great variety was found. Inferences of function for these vessels based on common-sense (e.g. cooking/serving pots have large openings for easy access and large bases for stability, and storage vessels have small openings and larger volume) were supported by factor analysis (Bayard 1984b). In addition, many of the vessels had small mammal and fish bones, as well as seeds, in the bottoms. The presence of small fish vertebrae in these vessels is suggestive that the fermented fish paste which is a staple of the modern diet was being made from the earliest levels of use.

Among the artifacts recovered from both burial and non-burial contexts are other indicators of daily life. Among the clay artifacts other than pottery were "spindle whorls", pellets, roof tiles, firebox fragments, spoons, rollers, and two small molded figurines. Bronze casting is suggested by the presence of ceramic molds, crucibles, and casting spillage as well as the bronze artifacts including an axe, pin, wire, bracelet, and ring. Iron artifacts were recovered in the later levels, including unidentifiable rusty fragments and lumps, a fishhook, nail or pin, knife, scissors, and an awl. Stone artifacts included axes and adzes, knives, grinding stones, hammerstones, pestles, and red pigment stones. Items of personal decoration were made of stone, bone or shell and included bracelets, rings, and beads.

Because of the hardness of the soils and therefore the absence of screening, evidence of the utilized fauna at Non Nok Tha is generally restricted to bones of large animals, and material recovered from the interior of ceramics. Confident statements can be made that domesticated cattle, pigs and dogs are present from the earliest levels (Higham 1975, 1989). Also recovered were bones of deer, frog, hare, mongoose, crocodile, fish, turtle and shellfish, however because of the lack of screening no conclusions can be drawn as to the relative abundance of these animals over time.

Mortuary Patterns

Non Nok Tha functioned as a cemetery, with intermittent use for industry and little evidence of occupation. The relatively small size of the site, high density of burials, the absence of middens, firepits, hearths and evidence of structures; the shallow depth of cultural deposits, and the low sherd density at Non Nok Tha suggest transient use, such as would have been practiced by swidden agriculturists (Bayard in press). There is evidence for continuity in the mortuary features over time, with three episodes of marked culture change, but not replacement [Table 2.2] (Parker in press). The presence of grave goods in the burials of children suggests ascribed status was present from the earliest levels at Non Nok Tha, although within each period there was a continuum of "poor" to "rich" burials.

Table 2.2. Mortuary Features of the Non Nok Tha Excavations

Period	Position	Grave Characteristics	Faunal Remains	Cultural Remains
Early (EP1-EP2) 3500-2500 bc	primary, supine, extended deliberate inclusion of portions of human bones in mounds	deep: 45-90 cm pots at head and foot, fill contained offerings, and large mound with offerings, different spatial area for children	portions of domesticated pig skulls, pig limbs, partial domesticated cattle limbs, domesticated dog, clam or mussel shells, single water buffalo bone	Mean 6.8 items vessels of food, 1G pots, stone adzes, strings of shell beads, rice chaff temper, evidence of social ranking
Transition (EP3) 2500 bc	disarticulation in adult males, suggests corpse allowed to decompose prior to burial		portions of domesticated pig, cattle, dog fish bones in bottom of vessels	Mean 4.5 items no beads or stone adzes first bronze artifact novel vessels clay pellets
Early Middle (MP1-MP2)	Four modes: 1. rich primary burials with two or more caps of goods 2. primary poor burials 3. secondary burials with small number goods 4. commemorative deposits of goods but no body	35-80 cm to shallow pits mounds smaller and flatter spatial distinction between "C" and "L" groups	portions of domesticated cattle, pig, and dog bones	1G and 1C pots, no 1A pots new vessels types 2C and 2L suggesting affiliative groups strings of shell beads, unworked blocks of sandstone bronze casting evidence pottery midden area in 1966
Transition* (MP3)	head to the west or southwest	narrow, trench-like, shallower graves 20-45 cm no mounding		Mean 9.4 items, less wealthy first bronze ornaments
Later Middle (MP4-MP6) 2500-1000bc	primary, supine, extended head orientation changes: MP4-SW, MP5-NW, MP6-SW skulls missing or disarticulated	medium depth 40-65 cms groups of pots in the fill and on top of the fill	clamshells in place of skull water buffalo bones	Mean 9.8 items bronze sporadic decline in wealth over time 2C and 2L pots continue
Terminal* MP7-MP8 1000bc	primary, supine, extended pot nests in 1968 excavation	shallower (30-55 cm)	rare animal bones as grave goods	Mean 4 items decline in grave goods
Late 100-1200 ad	cremation burials	ashes in pottery vessels	overall decline in large animal bones	raiding of MP for pots, evidence of house, iron, celadon

Source: Bayard and Solheim in press, Higham 1975. * Found in 1966 excavation only.

The Early Periods at Non Nok Tha (EP 1-3) are characterized by supine, inhumation burials with ceramic pots placed at the head and/or foot of the interment. No evidence of the presence of metal was recovered from these three levels. The first evidence of culture change occurs at the Early Period 3/Middle Period 1-2 (EP 3/MP 1-2) horizon with a change in burial ritual, the appearance of bronze in relative abundance with evidence of casting, clay spindle whorls suggesting the advent or increase in weaving, and clay pellets for use with the "pellet bow". Groups of distinctive vessels were placed with the burial, and on the surface of the filled grave, as well as within a large mound which was built up over the wealthier graves. More types of pottery were introduced, including the complementary distribution of type "C" and "L" vessels, suggesting the presence of at least two "affiliative" groups burying their dead at Non Nok Tha (Bayard 1984b).

Middle Period 3, found only in the 1966 excavations, is also interpreted as a transition zone, as the mounding burial ritual disappears. The first bronze ornament was recovered from this context. As the Middle Period progressed, there was a decrease in the wealth of grave goods, a decrease in the presence of large animal bones, and a decrease in the depth and size of graves.

The third cultural transition occurs between the Middle and Late periods in the 1966 excavation and includes a period of "abandonment", followed by the appearance of cremation burials, the presence of iron and celadon, with the presumption of Buddhist religion and paddy rice agriculture. Unfortunately, the transition zone was eroded away from the area of the 1968 excavations so it is unclear if there was true abandonment of the site, or if other unexcavated areas of the mound were being utilized instead. Investigation of skeletal stress indicators at the final transition is impossible because of the introduction of the practice of cremation.

Chronology

The excavations of Non Nok Tha recovered evidence of the "neolithic", the beginnings of the bronze age, as well as the introduction of iron, extending from approximately 3000/2500 B.C. to 200 A.D. The Non Nok Tha excavations remain important for documenting a true "bronze age", in which there was evidence of an advanced metal technology in the absence of iron (Bayard and Solheim in press). Although the chronology of the site has been under attack since the initial publications [e.g. summary in Bayard and Solheim in press], a discussion which is beyond the scope of this thesis, subsequent excavations in the past nearly 30 years have provided support for the initial dating sequence. For the purposes of this discussion, the exact dates of the various periods are not as important as clustering the burials with identified cultural traditions.

As stated above, because the two excavations could not be physically linked, and because of repeated erosion/deposits of the mound, relating the two excavations was problematic. Table 2.3 correlates levels identified in the two excavations with the Period designations established by Bayard (1971) in the 1968 excavation, and finally to the General Periods of northeast Thailand prehistory (Bayard 1984, Higham 1986).

Although, the first cultural transition zone is noted at EP 3/MP 1, and this would be an ideal point of division of the skeletal sample, the number of burials recovered from the Early Period is simply too small for meaningful analysis. While Pietrusewsky (1974b) added the MP 1 burials for paleodemographic analysis, in the final summary of the site, Bayard (in press) groups MP 1 and MP 2 as a cluster of shared mortuary and cultural features.

The next designated division at the site is MP 3, which only occurred in the 1966 excavation, and is described as transitional by Parker (in press), and is interpreted by Bayard as suggesting occupation by a different cultural group than that present in MP 1-2 and MP 4.

Table 2.3. Correlation of Chronology of the 1966 and 1968 Non Nok Tha Excavations

General Phases†	Total Burials‡	1966 Levels	1966 Burials‡	Overall Periods	1968 Burials‡	1968 Levels
Period D		XIV		LP6		XI
		XIII		LP5		X
		X-XII	Cremation Burials	LP4		IX
		---		LP3		Upper VIII
		IX		LP2		Lower VIII
		---		---		Not Present or Eroded
Period C		VIII		LP1		
		Abandoned		---		
	4 (9)	VII	4 (9)	MP8		
		---		---		
		VI		MP7		
Period B	28(49)	Not Present	7 (18)	MP6	8(12)	VII
		V		MP5	3(7)	VI
		IV-V		MP4	10(12)	V
	4 (6)	III-IV	4 (6)	MP3		Not Present
	19 (19)	II	8 (12)	MP2	11 (7)	
		I-II		MP1		IV
Period A	8 (3)	I	2 (2)	EP3	6 (1)	III
	16 (11)	I	1 (1)	EP2	8(4)	II
				EP1	7(6)	I
TOTAL‡	79 (97)		26 (48)		53 (49)	

Source: Bayard (1971), but includes only burial features with skeletal material. † General Periods designation after Higham (1989:98) and Bayard (1984b). ‡ Number of burials with secure context (number of burials with insecure context).

There are only ten burials from this level. Thus, in order to avoid trying to split the MP 1-2 burials, and in the interest of evening the sample sizes, for the purposes of this thesis, the EP 1-3 and the first three levels of the Middle Period are considered the "Early Group" of Non Nok Tha, while the MP 4 through MP 8 (the remaining levels with inhumation burials) are considered the "Late Group".

Social Organization

The mortuary patterns and burial goods at Non Nok Tha have been considered for evidence of rank (Bayard 1984b). The presence of infant and child burials with rich burial goods suggests ascribed wealth, while the presence of a continuum of poor to wealthy graves, and the presence of two distinct forms of a footed jar, suggest the presence of two groups, one of which was "poorer" than the other. Since there is no evidence of a dominant center or city during the General Periods A or B, the differences in wealth are proposed to be based on genetic affiliation.

Previous Osteology

The 1966 skeletal remains had been cleaned with small brushes and scalpels to remove as much of the adherent dirt and concretions as possible, reconstructed, and examined by Dr. Michael Pietrusewsky and Ms. Jean Kennedy in 1970. A summary report provided some of the first information on the origins and physical attributes of the ancient inhabitants of Thailand (Pietrusewsky 1974a). Along with general descriptive information, such as demographic variables, measurement and non-metric data in the skull and teeth, and brief descriptions of pathology, a multivariate analysis of distance was presented. Non Nok Tha cranial measurements and non-metric variation were compared to samples from Ban Kao, Thailand; modern Thai from the Anatomy Department, and several Pacific populations. While the modern Thai sample consistently showed some association with the Pacific populations, the Non Nok Tha and Ban Kao samples remained isolated, although not associated (Pietrusewsky 1974a:32).

The 1968 Non Nok Tha skeletal sample had been previously analyzed for the purpose of a summary report (Brooks and Brooks 1987), and an oral presentation dealing with the paleopathology of the series (Brooks and Brooks 1983). This series has also been utilized for global multivariate work by Brace (1978, Brace et al. 1991) and Turner (1979), and in a regional examination of modern Thai affinities (Nakbunlung 1994). Two Master's theses also utilized this material, one recording Harris lines (Crownover 1984), and the other testing sex and ethnic discrimination using mandible measurements and observations between Thai, Island Southeast Asia, and Amerindian populations (Stevens 1982).

Using age and sex data provided by Brooks, Pietrusewsky presented the demographics of the combined sample from Non Nok Tha (Pietrusewsky 1974b). Using a sub-sample of individuals with estimated ages in 5 year intervals (N=139), Pietrusewsky compared the demographic variables for "earlier" (EP 1-3, MP 1) and "later" (MP 2-8) phases of the site. The earlier burials exhibited "a lower mean age-at-death, higher infant and early child mortality, lower survivorship rates, shorter life expectancy, and complete absence of old-aged individuals" (Ibid.:133).

BAN CHIANG

Excavations at the village of Ban Chiang were first made by the Thai Fine Arts Department in 1967, in an effort to establish the provenience for an unusual red-on-buff painted pottery found eroding from the site. After a sherd of this pottery was dated (erroneously) by thermoluminescence to the fifth millennium B.C., the village and its pottery became internationally famous. Extensive looting for the antiquities market prompted further excavations by the Fine Arts Department in order to protect and preserve the unique cultural evidence, and documented a deep, rich and complex archaeological site. The Northeast Thailand Archaeological Project, a joint project between the University of Pennsylvania Museum and the Fine Arts Department of Thailand, under the co-direction of the late Dr. Chester Gorman and Mr. Pisit Charoenwongsa, undertook two seasons of excavation in 1974 and 1975, respectively.

Excavations were conducted "within the square", again, meaning that only those bones from a burial present in the excavation area were removed, but no cross digging was done. Unlike at Non Nok Tha, the soil matrix was screened through a 10 mm screen.

In the first season, a 75 m^2 area, in some squares more than three meters in depth, was removed from the yard of a private home near the highest portion of the central village mound. Forty-eight burials were identified and removed in this season (designated as BC). The site of the second excavation was an un-looted roadway, some 75-100 meters distant, from which a 55.75 m^2 area was removed, and 77 burials identified. Depth in this excavation (designated as BCES) extended to more than four meters. With a projected area of at least eight hectares for the prehistoric site, these excavations recovered only 0.16% of the mound surface area (White 1986).

A great deal of human skeletal material was recovered from Ban Chiang without burial connotation. In addition, most of the burials showed later disturbance with an absence of fragmented remains, whatever had been disturbed had been completely removed. Disturbances included large holes, postholes, and insect burrows, as well as disturbances of unknown origin. As well, there were disturbances which resulted in the redistribution of selected elements, without apparent pattern, within the burial pit, e.g. a clavicle found at the pelvis. While it is tempting to think that this may be the result of insects, the repetitive nature of these disturbances may reflect a cultural activity.

The majority of the burials were primary burials, extended, supine, with arms at the side. Some, but not all, had burial furniture, most with pottery laid at the feet, above the head or between the knees. Bronze bracelets and other artifacts were also found. The excavations at Ban Chiang document differential activities including habitation, unlike Non Nok Tha. Included are evidence of pits, ditches, clusters of bone fragments, sherds and postholes, though no overt, trodden prehistoric habitation surfaces were identified in the excavations, with the possible exception of one at BCES. The human skeletal remains recovered (N=127) were sent to The University of Hawai'i Physical Anthropology Laboratory, under the direction of Dr. Michael Pietrusewsky, for analysis and curation.

The untimely death of Dr. Gorman left the Ban Chiang project in an unanalyzed and unpublished limbo, which was eventually broken by Dr. Joyce White's doctoral dissertation re-examining in detail the chronology of the site (White 1986). The proposed chronology has been mired in controversy since the initial excavations (e.g. Higham 1986, 1994; White 1988, 1990). Additional material has been submitted for dating and the findings, along with the nearly completed final report on the excavations may serve to resolve the controversy. In the meantime, this dissertation abides by the revised chronology of White (1986).

Environment

Ban Chiang is 110 miles east of Non Nok Tha, in the watershed of the Songkhram River, in rolling lowlands, with limited access to the resources of the mountains. The village is located at the junction of three small streams. The climate includes distinct wet and dry seasons, each six months in duration, with nearly complete evaporation of the small lakes and upper reaches of the streams in the dry season (White 1984). The marked fluctuation in the availability of water is the greatest challenge.

In an ethnoecological study of the modern village of Ban Chiang, White (1984, 1989, 1995) documented that wild resources were densely clustered. Traditional rice agriculture includes the initial broadcast of seed in a mudflat. After one month's growth the rice is transplanted to the field, and rainfall is relied upon to inundate the field. However, White noted that wild rice grows along the lake and stream edges, suggesting that early residents of Ban Chiang may have simply "assisted" the wild rice by expanding the habitat. In addition, five types of wild yams, with overlapping life cycles and growing in differing microclimates, are harvested as another source of starch. Although cultivated yams form shallower tubers and are therefore easier to dig up, the modern Thai prefer a toxic wild yam. This yam requires days of preparation to leach out the toxins, but then keeps for days, or can be dried and preserved for months. These resources, likely to have been exploited with no land clearing, offer flexibility in gathering times and are less susceptible to water availability. White suggests that "diversity in exploitation and manipulation is the key" to handling the unpredictability of water.

Fine screening and flotation techniques employed in the Ban Chiang excavations produced extensive data on the prehistoric environment. Examination of the freshwater gastropods suggests a sharp wet-dry seasonality was also present in the early occupation of Ban Chiang. The presence of land snails suggests shaded woodland, within reach of a slow moving, clear stream. Common faunal remains in the early levels of the occupation (including fish, hare, civet, mongoose, otter, small and large rats, and frogs), as well as the absence of non-human primates, squirrels, and other evergreen forest species, suggest a

Table 2.4. Mortuary Features of the Ban Chiang Excavations

Period	Position	Grave Characteristics	Faunal Remains	Cultural Remains
EP I (3600-2500 BC)	Primary, supine, extended few flexed burials, infants buried in jars BC orientation is N-S axis, head pointing N. BCES orientation is NNW/SSW, head toward NNW.	One or more whole small to medium pots at head or foot	domesticated pig, cattle, dog, abundant shell middens, three fish species, frog, deer	Ceramics: black to grey, burnished and incised. rice inclusion
EP II (3000-1900 BC)			domesticated pig, cattle, dog; deer	Ceramics: curvilinear incised. crucible fragment, bronze fragments?
EP III (2100-1700 BC)			domesticated pig, cattle, dog; deer	Ceramics: beaker-type vessels bronze spearpoint
EP IV (1900-1400 BC)			domesticated pig, cattle, dog;	Ceramics: cordmarked pots bronze bracelets
EP V (1600-900 BC)	Orientation change: BC now NW/SE and BCES N/S, with heads in either direction		domesticated pig, cattle, dog; deer	Ceramics: incised and painted, small, globular, cordmarked
MP VI (1100-700 BC)	Primary, supine, extended close association of burials suggest sequential burial with disturbance and missing skeletal material	1 - 20+ pots deliberately broken to create "sherd-sheets" over body, some inhumation, others placed on flat ground and mounds built up	domesticated pig, cattle, dog; ?water buffalo bone in matrix, deer	Ceramics: incised and painted, large, whitish vessels with buff and reddish-yellow colors plant material inclusion iron fragments
MP VII (800-400 BC)			domesticated pig, cattle, dog; deer, water buffalo	Ceramics: incised and painted iron blade with bronze socket iron bangles
MP VIII (400-200 BC)			domesticated pig, cattle, dog; deer, water buffalo	
LP IX-X (300 BC-AD 300)	Primary, supine, extended	Whole vessels placed directly over the body	domesticated pig, cattle, dog; deer	Ceramics: 3 treatments: buff to orange pots with red-painted curvilinear designs, red pottery with burnished exterior, red pottery with red curvilinear designs. bronze ornaments, clay rollers

Source: White 1986.

deciduous forest habitat (Higham 1989:136). These faunal remains decline after Early Period IV and in subsequent periods, and there is an increase in open field fauna and water turtles, suggesting a transition to a more open, grassy landscape consistent with wet rice agriculture.

Throughout the temporal sequence, domesticated chicken, cattle, pig, and dog, are present and become more abundant with time. A complete dog skull recovered from BCES Burial 13 (LP X), and postcranial bones recovered from midden, suggest the prehistoric dog is related most closely to the modern dog and to the wolf, rather than to the indigenous jackal or cuon (Higham et al. 1980). Comparison of the development of exostoses of the third metatarsal of the cattle recovered from Ban Chiang, suggest that they were small and gracile, and probably not used as draft animals. The water buffalo (one specimen recovered from the Early Period V and two specimens from later levels) though, had exostoses as robust as modern draft animals (Higham et al. 1981). This finding, coupled with the evidence for landscape change suggesting forest clearing and open grassy fields, has been interpreted as marking the beginning of bunded, wet-rice agriculture (Higham and Kijngam 1979).

Mortuary Patterns

There was no change in the dominant burial position (primary, supine, and extended) throughout the Ban Chiang sequence, but there were changes in associated behavior (Table 2.4). In the Early Periods whole pottery vessels were placed at the head and foot of the remains. During the first Middle Period (VI), pottery was smashed over the body in a "sherd sheet". In the Late Periods, the mortuary behavior returned to whole vessels placed over the bodies of the deceased. Also, a few adult burials were flexed and infants were buried in jars in the Early Periods, practices which were not found in the Middle or Late Period burials.

Chronology

The 1986 chronology for Ban Chiang was generated using mortuary behavior and burial ceramic grouping. The three major divisions: Early, Middle, and Late, were determined by burial inhumation characteristics; phases were then drawn using ceramic group stratigraphy (White 1986). Five phases are proposed for the Early Period (EP I-V), three for the Middle Period (MP VI-VIII), and two for the Late Period (LP IX-X). The temporal provenience extends from the pre-bronze age (4th millenium B.C.) through the advent of iron and the beginning of long distance trade with China and India (300 A.D.).

Mortuary pattern, faunal remains, and artifact and ceramic groupings suggest a major change at the end of the Early Period. The last phase of the Early Period (EP V) has characteristics suggestive of both the Early Period (gravestyles) and Middle Period (burial orientation). Domesticated animals and rice are present from the earliest premetal levels, with bronze appearing in Early Period III, and iron and water buffalo in Middle Period VII. For the purposes of this dissertation, the first four phases of the Early Period (EP I-IV) will be defined as the Early Group at Ban Chiang, while the remaining levels (EP V, MP VI-VIII, LP IX-X) make up the Late Group.

Previous Osteology

A summary report on the combined skeletal sample, although unpublished (Pietrusewsky 1980), and two articles (Pietrusewsky 1982, 1984) have provided the baseline osteological data for the early inhabitants of northeast Thailand for the last two decades. The manuscript summarizes the descriptive information by dividing the skeletons into "early" and "late" samples, and includes multivariate distance studies.

The Ban Chiang skeletal collection (or, at least the cranial and dental material) has been examined by other researchers (e.g. Turner 1989, 1990; Brace et al. 1991, Hanihara 1992, etc.) for utilization in multivariate analysis of the peopling of Asia, the Americas, and the Pacific. Most find that there is little difference between the ancient and modern inhabitants of Thailand (see also Nakbunlung 1994).

When White (1986) adjusted the chronology of the site, reassigning burials in the temporal sequence, Pietrusewsky's temporal presentation was no longer applicable. With the assistance of the University of Pennsylvania Museum, a complete re-analysis of the Ban Chiang skeletal series was undertaken in the physical anthropology laboratory at the University of Hawai'i, from January through August 1993 (Pietrusewsky and Douglas in press). During the second analysis, association of the miscellaneous skeletal material was made where possible, and some of the inadvertent errors of the first analysis were rectified. Single, unassociated skulls were given burial numbers in the new analysis, as were clearly articulated clusters of bones which were presumed to represent a primary burial, subsequently disturbed.

COMPARISON OF NON NOK THA AND BAN CHIANG

Although each of these skeletal series provided previously unknown data on the prehistoric inhabitants of Thailand, each was too small to generate statistically valid conclusions for temporal change. To combine the two samples, some sort of comparative chronology must be established. In view of the disagreement on the independent chronology of each of the sites, it would seem a futile exercise. However, since this dissertation is primarily interested in documenting changes in the skeletal stress indicators over time and across cultural, environmental, and/or subsistence transitions, the absolute chronology is not as important as a relative one.

While it will be instructive to examine each of the sites in toto, an exercise never before accomplished with the Non Nok Tha skeletal series, an examination of temporal change requires that each of the samples be divided similarly (Table 2.5). The Non Nok Tha sample has been divided so that all of the Early Period and first three phases of the Middle Period are combined. This essentially includes "neolithic" remains with the beginnings of bronze use, while the remaining material encompasses the full "bronze age". Although no detailed faunal analysis is available at Non Nok Tha, the practice of including whole limbs of cattle and pigs in burial interments disappears at MP 4. At Ban Chiang, the early grouping also includes neolithic levels (EP I-II) and the earliest bronze age burials, while the later group encompasses the appearance of water buffalo and iron. Thus, at both sites, groupings are chosen (with some consideration of even sample sizes) which reflect a change in technology and natural resources, presumed to represent a shift in subsistence.

Subsistence systems during the early bronze periods at both sites would have been wide-ranging, "haphazard, opportunistic", including a "diversity of resources and exploitation strategies" (White 1995:62) in order to cope with environmental unpredictability. Over time, and with knowledge and experience, a more "systematic, integrated and focused" strategy developed which incorporated changes in technology, e.g. iron, plow, water-buffalo; landscape change, and population movement.

Several major differences between the two sites are apparent from this review of the archaeology: Non Nok Tha was a mortuary site without evidence of habitation, perhaps suggesting a diffuse community of related individuals, rather than the nucleated village seen at Ban Chiang (e.g. Bayard 1984b, Wilen 1986, White personal communication). Non Nok Tha is located closer to the resources, both raw material and subsistence, of the mountains than is Ban Chiang, as well as being farther to the west and thus, presumably drier (Higham 1975).

Table 2.5. Comparative Chronology of the Mortuary Deposits at Non Nok Tha and Ban Chiang

Years	General Period	Non Nok Tha	Ban Chiang
1000	D		
500 AD		ABANDONED	
	C		LP X
0			MP IX
			MP VIII
500 BC	B		
			MP VII
1000		MP7 - MP8	MP VI
			EP V
1500		MP 4 - MP 6	
			EP IV
2000		MP 3	EP III
	A	MP 1-2	EP II
2500		EP 3	
		EP 1- EP 2	EP I
3000			
3500			

Note: **Bold** lines indicate transitions chosen for this analysis. Source: Higham 1989, White 1986, Bayard 1971, Bayard and Solheim in press.

CHAPTER 3. RESEARCH METHODS

Each individual in each skeletal series (Ban Chiang and Non Nok Tha) was placed chronologically within the sample using the major temporal divisions established by the latest archaeological interpretation of the sites. Data were collected on each individual skeleton, encompassing the indicators of stress examined in the previous chapter. All the methods used were non-destructive and served to initiate a thorough documentation of the paleopathology of the skeletal collections, in the event that the remains are reinterred at a later time.

PREPARATION

Each burial was initially examined to assess the need for further cleaning or reconstruction. If additional procedures were required, cleaning was done using water and soft brushes and picks, and the remains were allowed to dry on several thicknesses of absorbent paper. The 1966 Non Nok Tha skeletal material required the most extensive cleaning, necessitating the removal of up to 1/4 inch of thick black dust with a dry brush, prior to washing in clean water.

After washing, further reconstruction was accomplished using a water-soluble glue, or in cases of poor bone quality, an epoxy cement, stabilized with masking tape and/or a sand box, until the glue was set. In many cases, the glue used in previous reconstructions had become brittle and fallen apart, requiring repair. Reconstruction of as many of the skeletal elements as possible was done, including all subadult remains, vertebrae and ribs, with an emphasis on the cranial vault, restoration of the dentition, complete long limb bone lengths and bone elements exhibiting pathology or anomaly.

NUMBERING

Since each of the skeletal series had been previously analyzed, a numbering system had been established, and the skeletons were variously labelled. Each element of the 1974 Ban Chiang remains had been labelled with the burial number assigned in the field (e.g. "2"), while each element of the 1975 series includes the designation "BC" along with the burial number assigned in the field (e.g. "BC 2") [Pietrusewsky 1980]. The Ban Chiang remains are stored, by individual skeleton, in labelled plastic bags, in metal cabinets.

The 1966 Non Nok Tha infracranial remains were curated, following the field numbers, in open wooden boxes, on open shelves, in a non-climatically controlled hallway. The skeletal elements were unlabelled and unwrapped in the boxes which were labelled with the field numbers, but the ink was often blotched, weathered, or in some cases the label was missing. These remains were covered with a thick layer of black dust/dirt. The cranial remains, also in open wooden boxes with paper labels, were stored within the climatically-controlled museum, and so were much cleaner.

Although in the initial osteological analysis, new "skeleton" numbers were assigned to the burials (Pietrusewsky 1974a), since the remains had been curated using the field numbers, that is what is used in this dissertation. Descriptions, photographs and measurements made by Pietrusewsky were invaluable in substantiating field numbers. However, in some cases, no skeletal remains could be found for field numbers, burials had been mixed within the open drawers, or the elements present in 1993 did not match those described by Pietrusewsky (1974a). In all cases, complete documentation of the labelling of the box and the skeletal material within it, and rationale behind assignment of a burial number, was maintained. Subsequent to my analysis, the infracranial remains were moved into the museum storage area, smaller elements were bagged in plastic, and the larger bone elements were labelled in indelible black ink using the designation "NNT" and the burial number.

The 1968 Non Nok Tha skeletal remains (University of Nevada-Las Vegas), were stored in plastic or fabric bags, in labelled cardboard boxes, skulls and infracranial remains separately. The bones had been dry cleaned, with limited reconstruction, but most were not labelled. The elements that had been labelled, had the designation "NP" followed by the burial number. Additional labelling was done for all skeletal elements removed for photography or radiography, following the same format.

ANALYSIS

Each individual burial was assembled anatomically on the flat surface of a table for inventory and analysis. A textual description of each burial, including archaeological context, completeness, preservation, associated faunal or cultural material recovered in the laboratory, associated human skeletal remains, and observations of pathology, anomaly or other noteworthy features was made (See Appendix C). A drawing of the elements of the skeleton was colored in showing the elements present, and an element inventory was completed. This inventory was designed to provide a "by bone" count for purposes of calculating the prevalence of healed fractures, periostitis, or other pathology or anomaly. Each burial was then evaluated for age and sex estimation, and stress indicators as detailed below.

Skeletal Element Inventory

In addition to a visual record of each individual burial, an element inventory was made. The goal of the inventory was to provide a count of complete skeletal elements which could be utilized in generating frequencies for pathologies and/or anomalies not systematically scored. Establishing frequencies of fractures, infection, and other observations is extremely difficult in an osteological analysis. In the past, observations were restricted to complete bones only, or substantially complete individual skeletons only, and frequencies were then reported by bone or individual. This strategy effectively eliminates any data collection from a large number of excavated human remains where preservation is less than excellent, and where disturbances of the burial area are common (such as Northeast Thailand), as well as denies the presence of pathology in bone fragments.

Since effective representation of fragmentary remains requires use of all of the data available, even if it occurs in a bone fragment, a numeric inventory of the skeletal elements, by side, was attempted. In the appendicular skeleton, a scoring system from 1-9 was utilized (Table 3.1). In the spinal column a complete vertebra was distinguished from the presence of the various typical fragments (body, arch, spine) and combinations of these. In the ribs, counts were made of the axial end, sternal end, body and combinations; while in the skull,

Table 3.1. Skeletal Element Inventory Scoring System

Code	Long Bones	Vertebrae	Ribs	Skull
1	Complete	Complete	Complete	Complete
2	Diaphysis	Body	Axial end	Fragments
3	Proximal epiphysis and proximal diaphysis	Arch	Body	
4	Distal epiphysis and distal diaphysis	Spine	Sternal end	
5	Midshaft segment	Body and arch	Axial and body	
6	Epiphyses only	Body and spine	Sternal and body	
7	Fragments		Axial and sternal	
8	Proximal end and diaphysis (3+2)			
9	Distal end and diaphysis (4+2)			

right and left sides were judged as either complete or fragments. The definition of "complete" was subjective based upon the ability to effectively observe the element for pathology, rather than measurement.

Subsequent to this analysis, *Standards for Data Collection from Human Skeletal Remains* [Standards], edited by Buikstra and Ubelaker (1994), was published, proposing an alternative method of element inventory. The primary difference in the element count methods is in the evaluation of each element: the Standards suggest a three-value system of observation, which includes preservation (>75% preserved, 25%-75% preserved, poor); applied to five sections of a typical long limb bone (proximal and distal epiphyses, proximal, middle and distal diaphyses). In the Standards system, the vertebral body and centra are scored separately, and the ribs are considered complete if the head and neck are present. My inventory data have been adjusted to correspond to the Standards, but since my method limited scoring to elements that could be utilized for observation, only a count of complete (i.e. ≥ 75% present) elements is presented. Data are reported as suggested by the Standards. While significant caution is in order, use of the tables to suggest frequencies of bone pathologies (per bone) appears to be practical.

Individuation in Adults

Adult Sex Determination

Sex estimation in adults was based upon the generally accepted morphological characteristics of the skull and pelvis (Bass 1987, Anderson 1969, Krogman and İşçan 1986). In individuals with incomplete or absent skull and os coxae, sex estimation was based on comparative bone measurements: humeral and femoral head diameters, long bone length, and length of the major tarsals, with the sex estimate designated as tentative (e.g. ?Male).

Adult Age Estimation

All available non-destructive methods for aging adult skeletal remains were utilized, according to the presence of the skeletal elements. In each case, a record of the predominant characteristics of the morphological changes and notation of the scoring system was maintained and is summarized in the burial descriptions (Appendix C).

In the cranium, fusion of the ectocranial sutures was assessed using the Meindl and Lovejoy (1985) system. This system is very straight-forward, is easy to follow, and scoring is relatively quick. The pterion region was most often missing or could not be reconstructed which interferes with assessment of the anterior-lateral vault sutures. In some cases, concretions, or a "wash" of thin, unremovable mud, on the outer cortex of the cranium restricted observations of the sutures.

The pubic symphysis was typically not preserved in these skeletal series. However, in a few cases this surface could be evaluated using the sex-specific three-phase methods of Gilbert and McKern (1973) and McKern and Stewart (1957), and the more easily applied Todd (1920, 1921) stages. In addition, the newer revision of Suchey and others, was applied (Brooks and Suchey 1990; Katz and Suchey 1986). No models were used in the assessment, rather, published photographs, descriptions and drawings.

Although the pubic symphysis was commonly missing, the auricular surface of the posterior os coxae is relatively sturdy and was often preserved, in the absence of any other portion of the os coxae. The auricular surface was evaluated, whether or not the superior iliac blade was present, using the Lovejoy et al. method (1985).

Since the sternal end of the fourth rib (İşcan et al. 1984, 1985) was typically not present or could not be identified because of fragmentation, any and all sternal rib ends present were evaluated for age estimation. This method is fairly straight forward as well, and is easily and quickly applied.

Although the majority of these methods were designed using known-age macerated autopsy specimens or reference skeletal collections which are not Thai or even Mongoloid, they represent the best methods for assessing age-at-death presently available. Most of the methods as published, also assume a complete and unweathered specimen, an uncommon occurrence in archaeological populations. In practice, observations using these methods were made on all portions or fragments of the requisite bone, giving at least broad estimates of age. For example, in an incomplete cranium, the sutures present were scored according to the Meindl and Lovejoy method, and summed, generating an "at least", or "older than" (≥), age estimate. While this approach stretches the method to the limit, some age indicator is better than none (Ubelaker 1989).

A final method of adult age assessment was dental wear. Dental wear has been suggested to be the best and most accurate method of aging the adult skeleton that there is (Lovejoy et al. 1985). However, in the absence of previous experience with an excavated population, and without the opportunity to seriate the dentitions, the use of dental wear would seem a bit problematic. In this analysis, data on wear of the maxillary and mandibular molars was collected following the 1-40 system of Scott (1979a, 1979b). This system was originally designed to be analyzed using principal axis and generate comparisons of "rate of wear" rather than age estimation. In addition, the dentition was assessed visually using a modified Brothwell (1981) system of four stages (none, enamel wear, dentin exposure, pulp exposure, wear to the roots) and an age estimate given on the basis of dental wear (i.e. dentin exposure of all molars indicates middle age).

A final age determination was made, without the benefit of computer analysis (e.g. Lovejoy et al. 1985), but using a multi-method approach. All of the possible estimators were recorded and evaluated as to skeletal completeness, preservation, and observer confidence, and a final averaging was made. Generally, in the evaluation, the lowest and highest estimators were disregarded. All estimators, sums, phase assignments, and age estimations are given in the individual burial descriptions.

Individuation in Subadults

Subadult Sex Estimation

Sex estimation in children prior to puberty is difficult and typically unreliable (Saunders 1992). While sexual dimorphism in the permanent dentition has been documented and utilized to estimate sex in adults, deciduous dental measurements have not been similarly investigated (De Vito and Saunders 1990; Saunders 1992). While there is no research specific to Southeast Asian populations, studies in a wide variety of subadult populations (e.g. Australian, West Indian, Canadian) suggest that there is statistically significant sexual dimorphism in the means of individual deciduous tooth measurements, as well as the occurrence of more variability in the maxillary teeth than the mandibular teeth (De Vito and Saunders 1990, Lukacs et al. 1983).

De Vito and Saunders (1990) present discriminant function equations, based on multivariate analysis of deciduous dental measurements, which serve to classify teeth according to sex. In this study of crown diameters of 162 deciduous dental casts from white Canadian children, significant sexual dimorphism was found in all of the tooth types, with male means being larger than female means. The largest differences were found in the maxillary lateral incisors, faciolingual (*sic*, i.e. buccal-lingual) right maxillary central incisor and the mesiodistal diameter of the right mandibular canine. Twelve discriminant function equations, using a combination of the measurements noted above, as well as measurement of the mandibular first permanent molars, were generated to achieve classification accuracy ranging from 76% to 90% (Table 3.2). Because the original sample was divided into four groups prior to discriminant analysis, and the researchers wanted to achieve the highest level of accuracy, there are three groups of equations which utilize identical tooth measurement variables, but have slightly different constant values: Equations #1 and #1a, Equations #2 and #3; and three equations using the mandibular right deciduous canine (Equations #5, #5a and #5b). These should probably be viewed as duplicates, and only one value selected to represent that particular cluster of tooth variables.

Table 3.2. Discriminant Function Equations for Estimating Sex (De Vito and Saunders 1990)

1. 1.500(RUDI2 FL)+1.091(RUDI1 FL)+0.654(LUDM2 FL)-1.489(LUDC FL)+1.640(RLDC MD)-20.342
a. 1.380(RUDI2 FL)+0.896(RUDI1 FL)+0.357(LUDM2 FL)-1.474(LUDC FL)+2.266(RLDC MD)-19.736
2. 1.899(RUDI2 FL)+1.174(LUDM2 FL)-1.750(LUDC FL)+1.653(RLDC MD)-20.138
3. 1.6250(RUDI2 FL)+1.239(RUDI1 FL)+1.135(LUDM2 FL)-1.141(LUDC FL)-18.564
a. 1.690(RUDI2 FL)+0.967(RUDI1 FL)+1.184(LUDM2 FL)-1.097(LUDC FL)-18.192
4. 2.084(RUDI2 FL)+1.688(LUDM2 FL)-1.353(LUDC FL)-18.425
5. 3.079(RLDC MD)-18.861
a. 3.051(RLDC MD)-18.699
b. 3.000(RLDC MD)-18.407
6. 0.542(RUDI2 FL)+0.279(LUDM2 FL)-0.723(LUDC FL)+1.058(RLDC MD)+1.837(LUM1FL) +0.628(LLM1 MD) -1.692(LLM1 FL)-17.423
7. 0.547(RUDI2 FL)+0.393(LUDM2 FL)-0.371(LUDC FL)+1.521(LUM1 FL)-21.314
8. 2.049(RLDC MD)+0.887(LLM1 MD)-0.516(LLM1 FL)-16.872

Note: R=right; L=left; U=upper; L=lower; D=deciduous; FL=faciolingual; MD=mesiodistal.

Two dimensions, mesio-distal and buccal-lingual (or facio-lingual), of all deciduous teeth, loose and *in situ*, as well as the permanent first molars, were measured in both skeletal samples. The mesio-distal measurement was made using the pointed tips of a Fowler Digital Caliper, from the mesial contact point to the distal contact point. The buccal-lingual measurement was made using the broad tips of the caliper, perpendicular to the mesio-distal measurement, at the widest part of the tooth (Hillson 1986, Mayhall 1992). The caliper measures to the nearest hundredth and measurements were recorded as such. The measurements recorded in the Ban Chiang and Non Nok Tha subadult teeth were analyzed using any or all of the DeVito and Saunders discriminant function equations which would fit the material.

In addition to deciduous dental measurements, examination of characteristics of the mandible and ilium (Schutkowski 1993) were also utilized for sex estimation in the Northeast Thai subadults. This technique was based upon a cemetery sample, with available coffin plates, of 61 subadults from the Spitalfields Christ Church cemetery in England.

Table 3.3. Morphognostic Traits of the Subadult Mandible and Ilium (Shutkowski 1993)

Morphognostic Trait	Male	Female
Mandible: Chin shape	prominent, angular	non-prominent, smooth
Dental arcade shape	wide canine alveoli protrude	rounded or parabolic shape
Gonial eversion	everted	rami aligned with gonion
Ilium: Sciatic notch angle	around 90°	> 90°/>>90°
Sciatic notch depth	deep	shallow
"Arch" criterion	follows the rim of the auricular surface	crosses the auricular surface
Iliac crest curve	pronounced "S" shape	faint "S" shape, flattened

Three traits of the mandible and four of the ilium are suggested to be morphognostic of sex (Table 3.3). The mandibular characteristics allowed a determination of male sex ranging from 73.9%-94.1% accuracy, but in females the mandibular traits were much less predictable. The ilium characteristics reached accuracy predictions ranging from 62.1% for the iliac crest curve to 81.2% for depth of the sciatic notch, much better than previous attempts at sexing subadult ilia using length and breath measurements (Weaver 1980).

In practice, the mandibular characteristics were found to be fairly straightforward, although when the teeth were not *in situ*, determination of the shape of the dental arcade was difficult. The described characteristics of the ilium were also straightforward and easily applied, with the exception of the iliac crest curve - an area of the bone which is often weathered and worn. To facilitate determination of the angle of the sciatic notch, the bone was laid on a paper and the notch traced with a pencil (the angle was <u>not</u> measured with a protractor). This technique served to substantiate visual determination, as well as provide a graphic representation of the angle.

Subadult Age Determination

In subadults, traditional aging methods include the measurement of diaphyseal bone lengths (Ubelaker 1978, 1989; Hoffman 1979, Fazekas and Kósa 1978), the presence and fusion of epiphyses, and evaluation of the degree of tooth calcification and eruption (Smith 1991, Saunders 1992, Ubelaker 1989). The maximum length of all complete diaphyses, right and left sides, was measured using sliding calipers or an osteometric board consistent with the size of the bone. In the fetal, infant and younger children, the length and breadth of the *pars basilaris*, and the length of the *pars lateralis*, were taken using sliding calipers (Redfield 1970, Krogman and İşcan 1986). All measurements were recorded to the nearest millimeter.

The maximum diaphyseal lengths of the major long limb bones were compared to Hoffman (1979) and Ubelaker (1989). Hoffman's data is based on American middle-class mostly female children, but does lend support to the notion that variation in diaphyseal lengths is no greater than variation in dental formation, and that as age increases the amount of variability increases. Ubelaker's figures are based upon skeletal remains and determination of age based on dental formation and eruption, hence, additional errors are introduced because he did not use a known-age population. Both analyses support the femoral diaphysis as the most reliable indicator. In both of these references, the results are presented in a figure, with the length axis graded at 20 mm intervals, and the age axis at one year intervals. Location of a measured diaphyseal length necessitates the time-consuming task of estimating the length on the axis and then dropping the perpendicular to the age axis at both the upper and lower intervals and recording the age estimate.

Observations of the presence and fusion of the epiphyses and synchondroses of all parts of the skeleton were made on all subadults. Particular attention was paid to recording the stage of fusion of the tympanic ring (Weaver 1980), fusion of the posterior and anterior intra-occipital synchondroses (Redfield 1970), as well as fusion of the vertebral elements, and fusion of the appendicular epiphyses in older subadults (Krogman and İşcan 1986). Use of the presence or formation of epiphyses was extremely limited because of a general lack of recovery of the small bones of the skeleton due to the extreme hardness of the soil and difficulty in screening.

Dental formation and eruption were recorded in a visual format, using illustrations compiled from 17 different American Indian and other populations and published by Ubelaker (1989:64). The deciduous and permanent dentitions are represented. Since data suggest that American Indian teeth erupt earlier than whites, the illustration adjusts eruption toward the earlier range of the data. These illustrations are also provided by the new suggested standards for human skeletal data collection (Buikstra and Ubelaker 1994).

There has been significant criticism of dental eruption as a method of age determination, and wide acceptance that mineralization and calcification are more accurate methods of age estimation (Ubelaker 1989, Saunders 1992). When possible, observation of the crown and root formation in the deciduous and permanent dentition was made and interpreted (Moorrees et al. 1963a, 1963b; Demirjian et al. 1973). However, no teeth which had been glued into the sockets were removed for this observation, and unerupted teeth could not be observed without radiograph. Attempts to use the Faxitron radiography machine to film intact mandibles proved impossible because of the difficulty of positioning the bone to get a clear, accurate depiction of the unerupted teeth, and the inadequacy of the film and beam type for documenting fine details. Radiographs of selected intact subadult dentitions from the Ban Chiang skeletal sample (n=8) were made using a dental radiology machine and dental film, however, dental radiography was not available in Bangkok or Las Vegas, severely limiting use of dental calcification for subadult aging. In the Non Nok Tha samples, reliance was placed on gross observation of the dentition following Ubelaker (1986).

The quality of the bite-wing radiographs on these eight subadults was excellent, but interpretation was difficult because of movement of the tooth crowns within the crypts, opacities which may or may not represent dental features, and missing teeth. In these eight individuals, dental calcification was estimated, by sex, following Moorrees et al. (1963a) and Demirjian et al. (1973) [See Tables A.9 and A.10]. The Moorrees method is adaptable to incomplete specimens, but the charts proved difficult to use, requiring substantial time to assess the stage, rule the scale, determine the mean, and follow two standard deviations, for each available tooth, then average the means for the final age estimate. In addition, the presence of different mesial and distal root formation scores in the molars added interpretive difficulty.

The Demirjian method, in contrast, was easily and quickly applied, although the drawback is the requirement for seven mandibular permanent teeth, rendering it useless in incomplete specimens, and in those under three years of age. Comparisons of these three methods of dental age estimate (Table 3.4), document estimates that are fairly consistent. While the Moorrees and Demirjian estimates have the illusion of precision, because they are population-specific, the lack of a range of ages is problematic. Although Ubelaker does not present sex-specific illustrations, he has incorporated the known earlier development of the dentition in Amerindians, a finding likely in Southeast Asians, and confirmed in Pacific Islanders as well (Fry 1976).

Table 3.4. Dental Calcification Age Estimates in Selected Ban Chiang Subadults

Burial	Sex	Moorreess*	Demirjian†	Ubelaker‡
1-40	?F	2.25	<3	2-3
1-42	?M	3.5	3.7-3.8	3-5
2-5	?M	5.25	7.2-7.3	6-7
2-8	?F	1.75	<3*	1-3
2-44	?F	1.4	3.3-3.4	2-4
2-52	?M	5	6.9-7.0	6-7
2-54	?F	3.75	5.9-6.0	3-5
2-62	?F	5.38	>5*	4-6

* Moorrees et. al. (1963a 1963b) permanent and deciduous teeth average of means (See Table A.10).
† Demirjian et al. (1973) seven mandibular permanent teeth scoring system (See Table A.9).
‡ Ubelaker (1989). * Less than seven teeth scored.

Long Limb Bone Measurements/Stature

An osteometric board and sliding calipers were used to measure (in mm) the maximum length and anatomical, or physiological, length of each of the major long limb bones in adults, and the major long bone diaphyses in subadults.

Stature estimations in adults were calculated using all available complete long limb bone lengths. A single estimate for each individual, within each method, was chosen based upon the lowest standard error. Estimates based on Sangvichien et al. (1985, nd) and Sjøvold (1990) formulae were generated in both males and females. In males, an additional stature estimate was generated using the Trotter and Gleser formulae based on Mongoloids (Trotter 1970, Trotter and Gleser 1958), with the appropriate adjustment to the tibia formulae (Jantz et al. 1994).

Segment measurements were made on fragmentary skeletal remains using the American Indian formulae for estimating bone length (Steele 1970). However, because the standard error is compounded with stature estimates, these estimates are used strictly for augmenting description of an individual burial rather than as population parameters.

Radiography

Radiographs were taken of all complete long limb bones (intact or reconstructed), crania, and pathological skeletal elements. Because the skeletal remains had to be transported out of the research laboratory to the radiologic facility, as skeletal analysis proceeded the appropriate remains were set aside until enough for an afternoon's work. All radiographs were made with the assistance of a qualified radiologic technician, using the available machines and film. In Honolulu, radiographs were done using a clinical specimen machine called a Faxitron (Hewlett Packard 43807N, 0.5 mm focal spot, and SID 48"). Radiographs were made using T-MAT G film (400 speed) and Kodak Lanex Regular screens (11x14) and extremity cassettes (8x10), and developed with a Kodak processor.

In Bangkok, Thailand, conditions were somewhat more primitive. The filming was done at a private clinic using a Chinese-made, portable machine (Model SMIC F-30) which could produce a maximum of 30 mA and 85 kv. Fuji medical radiograph film and an Okamoto Japanese high speed intensifying screen in two sizes were used, and developing was done by hand. The 1968 Non Nok Tha skeletal remains were radiographed at the Radiological Sciences Department, University of Nevada-Las Vegas, using a Japanese-made single phase Duocan M radiographic machine, Lanex Regular and Extremity screens, and two sizes (8x10, 11x14) of CPG double emulsion green radiographic film.

In all cases, the skeletal elements were placed directly on the screen and the X-ray beam adjusted for minimal scatter. The elements were positioned in as close to an anatomical anterior-posterior position as possible, using masking tape and foam pillows for support, although ease of positioning was taken into account. For example, a complete femur lies quite nicely on the condyles and greater tuberosity, although this is not quite anatomically correct. Cranial radiographs were made in two views, anterior-posterior and lateral, with an emphasis on the cortex of the vault rather than the internal structures. A foam pillow in the shape of a "U", was used to position the cranium in the Frankfurt plane for each view. Each skeletal element was identified with lead numbers placed on the screen, according to the burial number.

To increase efficiency, test exposures were made on each of the radiograph machines for each of the major long limb bones. The film was developed and exposures adjusted. These exposures were recorded and used as a reference, so that all of the tibia were filmed at the same settings; femora, humeri, etc. Like elements were grouped on a single film and radiographed using a single exposure. In the event of a poor exposure, the film was repeated. Although this method results in less than perfect radiographs for the bones outside the center of the X-ray beam, for the purpose of Harris line evaluation and general pathology evaluation, they are adequate. To conserve film, some "blocking" was done; i.e. an AP film of the tibia was taken on one-half of a 11x14 film while the other half was "blocked" with a lead shield, then the shield was transferred to the exposed side, and the lateral exposure of the same bone was made.

While all of the technique settings (mA and kv) were recorded and maintained, the variety of machines and situations, predicated a new evaluation each time. A change in the film, cassette, and type of machine necessitated a new and different technique at each location. While it would be desirable to be able to prescribe a specific radiographic method, the reality is that no matter what the equipment is, a good radiologic technician is an absolute necessity. While it is easy enough to advocate systematic radiographs of all of the bones of the skeleton, or at least the skull and os coxae (c.f. Rothschild and Rothschild 1995a), suitable radiographic facilities are often difficult to access. The radiographs done in Bangkok are of very poor quality because of the use of a portable machine and hand processing.

In addition to problems in the radiologic techniques, the skeletal elements themselves contributed additional problems. Sand and dirt had permeated much of the marrow, filling the spaces between the trabeculae with radio-opaque material, and post-depositional breakage, and cleaning, allowed the removal of much of the internal bone structure. In the crania, attempts at reconstruction rarely restored the fragile structures of the internal vault (e.g. sphenoid body and horns), making radiographs difficult to evaluate because of a lack of internal landmarks. Still, in spite of these problems, much information was gained.

Indicators of Anemia

All bones of the skeleton, especially the skull, sternum, and pelves were grossly evaluated for signs of thickening or enlargement which may be indicative of the marrow expansion associated with iron deficiency anemia. All affected elements were described, photographed and radiographed. Each orbit was evaluated for cribra orbitalia and the type, extent, location and evidence for healing, recorded (Mensforth et al. 1978, Steinbock 1976). In the cranium, porosis was described (location, extent, size of holes, evidence for healing). In an effort to quantify "thick", vault thickness measurements were made, using standard pointed-tip, spreading calipers, at ten locations on the cranial vault (Ishida and Dodo 1990, Webb 1989). In cases of a complete or nearly complete vault, some of these measures were difficult to make because of the physical characteristics of the spreading calipers. The relative proportions of diplöe (marrow) and cortex were measured, using digital calipers, at selected locations. Unfortunately, because of the non-destructive nature of this analysis, the exact location of these measurements could not be duplicated from cranium to cranium, severely restricting the usefulness of the data.

The radiographs, two views, of all complete and nearly complete (i.e. calvarium) crania were evaluated for signs of diplöic thickening. The amount of mineralization in the vault and the effects of weathering and extensive reconstruction severely restricts interpretation of the skull radiographs. Measurement of the thickness of the cortex on radiograph proved futile because of insecure landmarks and inability to accurately duplicate the views. In an effort to visualize the diplöe, the exposure time was increased to the point of losing all exposure of the remainder of the vault, sinuses, etc. and still, the space could not be penetrated.

Dentition

To establish baseline data on completeness, each of the permanent and deciduous dentitions, was examined for tooth presence, tooth loss (premortem, postmortem, deliberate or ablation), eruption status, impaction and agenesis. Each tooth/socket of the permanent and deciduous dentitions was then assessed for the presence of caries, abscessing, calculus, and hypoplasia; and alveolar resorption in adult jaws (Powell 1985, Lukacs 1989, Kelley and Larsen 1991). Each tooth received a single score for caries, using the classification shown in Table 3.5.

Table 3.5. Dental Caries Coding System (after Larsen et al. 1991)

0=none				
1=occlusal surface	1A=fissure	1B=cusp	1C=gross (too large to tell)	
2=interproximal surface	2A=mesial	2B=distal		
3=crown surface	3A=buccal	3B=lingual		
4=cervical-enamel junction	4A=mesial	4B=distal	4C=buccal	4D=lingual
5=huge caries				

One drawback of this method is that multiple caries on a single tooth are not recorded. Although this was a rare occurrence, additional caries were noted and described, while the position of the largest defect was scored.

Abscessing was scored as present or absent, and recorded graphically. The degree of calculus was scored on a four point scale (none, slight, moderate, marked), by tooth. Alveolar resorption was similarly scored, but was based upon the amount of porosity and absorption of the alveolar rim of the tooth socket (Clarke and Hirsch 1991, Hildebolt and Molnar 1991), rather than the amount of tooth root exposed above the alveolar rim.

A general assessment of dental wear in each tooth of the deciduous and permanent dentitions was made following Brothwell (1981:72): 0=none, 1=enamel wear, 2=dentin exposure, 3=pulp exposure, and 4=roots. In addition, attrition in the adult molars was evaluated using the Scott system, wherein each quadrant of the occlusal surface is scored on a scale of 1-10 (none to no enamel present). The quadrant scores are summed for a tooth wear score which ranges from 1-40. Analysis of these data is not included in this dissertation.

Using a hand lens, and oblique lighting, each deciduous and permanent tooth was evaluated for dental enamel hypoplasias (Goodman et al. 1980, Rose et al. 1985, Goodman and Rose 1990). The presence of a defect was noted, by type, as follows (adapted from the Federation Dentaire Internationale): 0=none, 1=linear horizontal line, 2=linear vertical groove, 3=linear horizontal arrangement of pits, 4=non-linear pits, 5=single pit, 6=color change (Skinner and Goodman 1992:157). Although this system of classification does serve to distinguish the types of defects, the intensity of the defect and/or multiple defects per tooth are not coded. The presence of two different types of defects on a single tooth, although infrequent, was noted, and the larger or most obvious defect was coded.

In the easily visualized, discrete defects, measurement (to the nearest hundredth millimeter) of the distance of the defect from the cemento-enamel junction was made using a digital dental caliper and recorded. All defects on a given tooth were measured. The computer software program by Murray and Murray (1989), [using equations developed by Philip Walker based upon the Goodman et al. 1980 chronology] was utilized to calculate an approximate age-at-occurrence (Goodman and Rose 1990).

Osteoarthritis

All articular surfaces of the long limb bones, including differentiating portions of the joint surfaces (e.g. medial and lateral femoral condyles, medial and lateral tibial plateau, etc.), were examined and scored, by side, for signs of degenerative osteoarthritis. The carpals, metacarpals, tarsals, and metatarsals were scored separately, while the phalanges were summarized by row: proximal, middle and distal. In the axial skeleton, the mandibular

Table 3.6. Osteoarthritis Coding

Lipping		Porosis		Lipping + Porosis	
Code	Degree	Code	Degree	Code	Degree
1	slight	4	slight	7	slight
2	moderate	5	moderate	8	moderate
3	marked	6	marked	9	marked

condyles, occipital condyles and mandibular fossae were examined, as well as two surfaces on each rib: the head and the tubercle. In the spine, all available surfaces were examined: superior and inferior bodies; superior and inferior, right and left articular facets; and right and left rib facets; in the cervical, thoracic, lumbar and first sacral segments.

The scoring system (Table 3.6) was devised to distinguish two kinds of degenerative change: lipping and porosis, on a scale modeled after Brothwell (1981:150). All cases of eburnation or fusion, and observations of asymmetry, were described separately and documented with a drawing and photograph.

The resultant data are both detailed and expansive, and difficult to assimilate. To facilitate reporting of these data, the individual articular surfaces of the appendicular skeleton are collapsed into "functional units" as shown in Table 3.7.

Table 3.7. Definition of Appendicular Functional Units

Functional Unit	Element	Articular Surface
Shoulder	Clavicle	Medial and distal
	Scapula	Acromion and glenoid
	Humerus	Head
Elbow	Humerus	Trochlea and coronoid
	Radius	Head and ulnar facet
	Ulna	Trochlea
Wrist	Radius	Distal and ulnar notch
	Ulna	Distal
	Lunate	Radial surface
	Scaphoid	Radial surface
Hand	Six carpals	Carpal and metacarpal
	Metacarpals	Proximal and distal
	Phalanges	Proximal and distal
Hip	Sacrum	Sacro-iliac
	Innominate	Auricular and acetabulum
	Femur	Head
Knee	Femur	Medial and lateral condyle, patellar surface
	Patella	Medial and lateral
	Tibia	Medial and lateral plateau, fibular facet
	Fibula	Proximal
Ankle	Tibia	Distal
	Fibula	Distal
	Talus	Dome
Foot	Talus	Head, calcaneal facet
	Other tarsals	Tarsal and metatarsal facets
	Metatarsals	Proximal and distal
	Phalanges (by row)	Proximal and distal

In the axial skeleton, the articular surfaces are also combined by level, e.g. the inferior articular facets of the first thoracic vertebra are combined with the superior articular facets of the second thoracic vertebra. In this manner, the functional unit of the spine at T1-2 is a summation of the four articular facets that comprise it.

Additional Observations

Although not systematically scored, the complete skeleton of each individual was grossly assessed for any indication of infectious disease and traumatic injury (Kelley 1989; Ortner and Putschar 1981, Merbs 1989). Lesions suggestive of infectious disease were described in detail as to location, extent and status (healed *vs* active) following terminology suggested by the First Consensus Committee for Descriptive Terminology (Ragsdale and Ortner 1992). Radiographs, in a minimum of two views, were taken of each affected element, as well as photographs documenting the lesions.

Traumatic injuries, typically healed and unhealed fractures, were also assessed by visual, photographic and radiographic examination, with particular attention to the presence of displacement (angulation or rotation), overlap, and the extent of remodeling (Roberts 1988, 1991). The bone element inventory was used to estimate the prevalence of fractures by bone (Jurmain 1991). Skeletal elements were also evaluated for other signs of trauma such as dislocation, ligament injury, signs of medical intervention such as trephination, etc. All traumatic and infectious lesions were evaluated with interpretive input from clinical radiologists and physicians (Rothschild 1992).

Statistical Tests

The primary method of inferential statistical analysis employed programs written using SASPC, Release 6.03 software (SAS Institute, Inc. 1988a, 1988b, 1988c). The level of significance for all statistical tests is α=0.10, rather than the more often utilized 0.05 level, a choice made to permit a wider allowance for possible differences in the face of small sample size, although there is, of course, an increased risk of error.

The chi-square (χ^2) statistic assumes the following: "data measured at the nominal scale or any higher level of measurement, at least two samples and at least two mutually exclusive categories into which the observations may be placed, no category should have an expected frequency less than one, and not more than one category in five should have an expected frequency less than five" (Norcliffe 1982). The SASPC program computes the χ^2 statistic with an advisory caution if more than 20% of the cells have an expected value of less than five. In these cases, and in those where a cell has an expected value less than one, the Fisher's Exact Test is used. The Fisher's Exact Test calculates the probability of obtaining values "as extreme or more extreme" than the observed values (Thomas 1986). Since the calculation is an exact probability, it is evaluated directly against the selected significance level, α=0.10, for example, an FET probability of 0.234 is greater than 0.10 and therefore not in the region of rejection of the null hypothesis.

For analysis of metrical data, the most commonly used statistical test is the Student's *t* test, which tests the assumption of the independence of two means. Again, the SASPC program performs the *t* test, along with a test of the equality of the variances (F test), and reports a calculated *t* value with the assumption of equal as well as unequal variances. The Student's *t* test is designed for two independent random samples (N<30) from a normally distributed population (Norcliffe 1982). Interpreting the computer printout requires first, evaluating the F test results to determine if the assumption of equal variances is valid, followed by evaluation of the *t* value. In most cases, results provided include both the calculated *t* values as well as the probability (given by the SASPC) of a value greater than *t*, a probability which is reported in these results.

In general, all statistical testing was done without a priori knowledge of the observed frequencies, e.g. all tests are non-directional, two-tailed. Null hypotheses are not stated at each occurrence, but are assumed to be "no difference" (Norcliffe 1982:31).

Terminology

A brief word is necessary regarding the terminology used to discuss the presence of stress indicators in these skeletal samples. In the discipline of epidemiology, two terms are used to describe the occurrence of disease: "prevalence" and "incidence". Incidence is the number of new cases of a disease observed during a particular time period divided by the total population at risk, this calculation does not include those who already have the disease in the denominator. Since it is impossible to determine the number of new cases in a skeletal population, the incidence of a particular disease is impossible to determine. Prevalence, on the other hand, the proportion of the total number of cases to the total population, is easily calculated using skeletal remains (Waldron 1994).

Throughout this document, the terms "frequency" and "prevalence" will be used interchangeably to discuss this proportional relationship. This use is not to be confused with prevalence meaning "the condition of being prevalent" or "widespread" or "extensively existing" (Webster's 1966).

CHAPTER 4: BAN CHIANG INDICATORS OF STRESS

The results of analysis of the Ban Chiang skeletal collection for a variety of indicators of stress are presented in this chapter. Each section will begin with a general summary of the more detailed data which is presented in Appendix B (designated Table B.X). Discussion then centers on the evidence for sex differences in these indicators, distribution by age-at-death, and examination of change over time.

PALEODEMOGRAPHY

It is apparent that the Ban Chiang skeletal series suffers from archaeological, cultural, and environmental biases: since only a small area of the total mound was excavated, there is a long temporal sequence, and there was differential use and substantial disturbances over time. Not withstanding these biases, the rather structured layout of the burials (especially in the 1975 excavation) suggests that the sample may contain members of the same lineages over time. For the purposes of this discussion, the two seasons of excavation will be considered as a single sample. Those interested in details on the separate excavations should consult Pietrusewsky and Douglas (in press).

The Ban Chiang skeletal sample comprises 140 individuals (Table 4.1). While only 17 of the individuals could not be sexed (3 adults), substantially more (40) have only general age-at-death estimations. This large number substantially reduces the detail of information available and is primarily the result of failure to completely excavate a burial which only partially extended into the excavation unit, as well as poor preservation. There are three sets of fetal remains, identified as less than 9 lunar months, with 9 lunar months and above considered newborns. Of the 137 remaining individuals, 35 are less than 15 years of age, 7

Table 4.1. Age and Sex Distribution of the Ban Chiang Burials (1974 and 1975 Excavations)

Interval	Male	Female	?Sex	Total
Fetal	1	2		3
N.B. - 0.9 yrs	3	2	4	9
1 - 1.9	2	1		3
2 - 2.9		2		2
3 - 3.9	1	2	3	6
4 - 4.9	1	2	2	5
5 - 5.9	1			1
6 - 6.9	2	1	2	5
7 - 7.9		1		1
8 - 9.9			1	1
10 - 11.9				
12 - 14.9	1		1	2
15 - 19.9	3	2	2	7
20 - 24.9		4		4
25 - 29.9	3	5		8
30 - 34.9	2	1		3
35 - 39.9	7	7		14
40 - 44.9	5	3		8
45 - 49.9	11	4		15
≥50	1	2		3
Adult	6	7	2	15
Young adult	2	5		7
Mid-aged	11	7		18
TOTAL	63	60	17	140

are between the ages of 15 and 19 years, and 95 (69.3%) are adults over the age of 20 years. Subadults (0-19.9 years) comprise 30.7% of the sample, at the low end of the frequency expected in an unbiased cemetery population (Weiss 1973). The child:adult death ratio is 0.432 (41:95). The sexes are equally represented (63:60).

Graphically illustrating the age distribution (omitting the adults of indeterminate age) easily demonstrates the clustering of individuals in the middle-age categories which is an example of the tendency of aging methods to "underage" adults, and a rather erratic distribution of deaths over the other age intervals (Figure 4.1). The lumping of adult deaths in the early middle age intervals (35-45 years), typical of archaeological populations, is likely an artifact resulting from age estimation methodology (Jackes 1985). One estimate of fertility: the ratio of individuals less than age 15, to females from 15-45 years, (0.68 at Ban Chiang), excludes females that have indeterminate ages, relies on accurate aging techniques, and is susceptible to subadult under-representation (Jackes 1992:215).

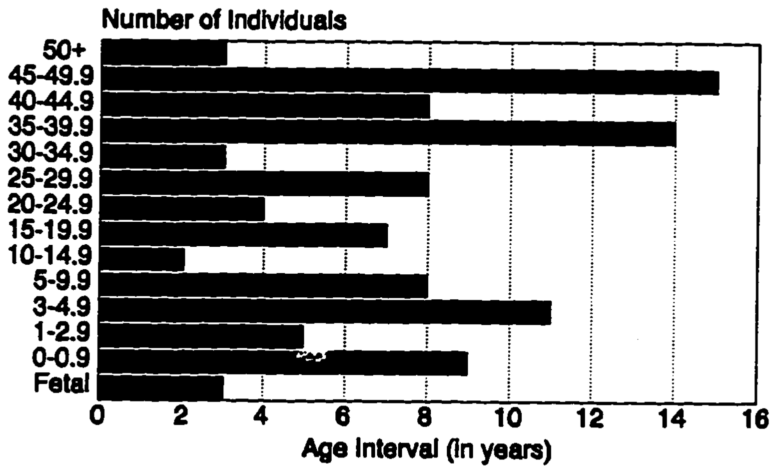


Figure 4.1. Age Distribution of the Ban Chiang Sample

Since it is vital to include all of the burials recovered in a skeletal sample, in the subsequent discussion, the adults of indeterminate age are distributed over the adult age intervals (Ubelaker 1989, Jackes 1992). The "adults" are distributed over seven age intervals (20-50+), the "young adults" over three intervals (20-35), and, since most of the aging methods underage, the "middle-aged" individuals are distributed over four intervals to include the oldest interval (35-50+). Including this component of the burial series, helps to smooth out the age distribution, as well as allowing examination of the age-at-death distribution by sex.

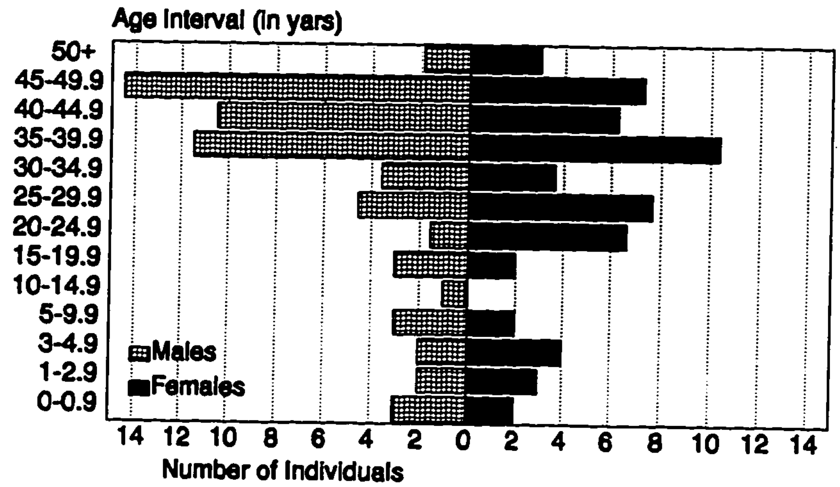


Figure 4.2. Sex Distribution of Ban Chiang Burials

Examining the age distribution by sex (Figure 4.2), shows an even mortality in childhood, but an apparent difference in the adults: females are more at risk in young adulthood, in contrast to males who appear in the later middle-aged brackets. This difference may be due to a bias in the aging methodology which underages females more than males, or if it is "real", may reflect the stresses of childbearing acting on females. The low number of young male deaths is suggestive of an absence of warfare, ritualized violence, or other extremely risky activities which would preferentially impact young men.

Because this sample has a large number of adults of indeterminate age, it would seem a good candidate for the "fertility" approach to paleodemography (Jackes 1992, Buikstra et al. 1986, Konigsberg et al. 1989). However, a more traditional abridged life table (after Ubelaker 1989, Table B.1), can provide an important data point: the "life expectancy at birth" (e_0). This calculation can be interpreted as the mean age at death of the sample, and is comparable (as the inverse) to the birth rate (Sattenspiel and Harpending 1983). Since the Ban Chiang skeletal sample has accumulated over a long time span, population stationarity is a valid assumption for the total sample (Ibid:492). The life expectancy at birth or mean age at death of the Ban Chiang sample is 29.2 years, and the birth rate [the inverse of the life expectancy at birth ($1/e_0$)] is 0.034 or 3.4 births per 100 people.

Emphasizing the lower end of the age-at-death distribution, where aging is more accurate, and removing the necessity of distributing the adults of indeterminate age, is an abridged life table where all of the adults are lumped together into a single age interval (after Jackes 1992) [Table 4.2]. As expected, the life expectancy at birth increases to 30.86, since there are more "older" adults. The estimators proposed to help mitigate the problems of underaging adults and under-representation of subadults can be calculated from this abridged life table.

Table 4.2. Abridged Life Table for Ban Chiang

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-4.9	5	25	18.25	100.00	0.183	454.4	0.040	3085.8	30.86
5-9.9	5	8	5.84	81.75	0.071	394.2	0.015	2631.4	32.19
10-14.9	5	2	1.46	75.91	0.019	375.9	0.004	2237.2	29.47
15-19.9	5	7	5.11	74.45	0.069	359.5	0.014	1861.3	25.00
20-24.9	5	4	2.92	69.34	0.042	339.4	0.019	1501.8	21.66
25-60	35	91	66.42	66.42	1.000	1162.4	0.057	1162.4	17.50
Total		137							

Note: After Jackes 1992. *x = Age interval in years n_x = Width of age interval x D_x = Actual numbers of observed deaths at age x d_x = Number of individuals dying at age x, based on a cohort of 100 l_x = Survivorship at age x q_x = Mortality rate or probability of dying at age x L_x = Number of years lived between age x and $x+1$ m_x = Age specific death rate for age interval x T_x = Total number of years lived beyond age x e^o_x = Expectation of life at age interval x (life expectancy).*

One indicator of fertility is the ratio of individuals over age 20, to those aged five years and over (Buikstra et al. 1986, Konigsberg et al. 1989). At Ban Chiang this ratio is 0.848 (95/112), or using the provided regression equation, a birth rate of 29.66. These researchers do not advocate doing the calculations as that imposes numerous assumptions onto the archaeological data, rather, by comparing the proportion alone, temporal trends can be seen. Jackes proposes two estimators to mitigate the problems of underaging adults and under-representation of children: The Juvenile:Adult Ratio (JA), and the Mean Childhood Mortality (MCM) [Jackes 1992].

The JA (ratio of individuals aged from five to 14.99 years to those over 20 years) is 0.105 (10/95). The q value, or probability of dying, can be used to calculate the MCM, or average of the childhood q values (${}_5q_5$, ${}_5q_{10}$, ${}_5q_{15}$,). At Ban Chiang, the MCM is 0.053 [(0.071 + 0.019 + 0.069) / 3]. The use of both JA and MCM, graphed against each other, may help

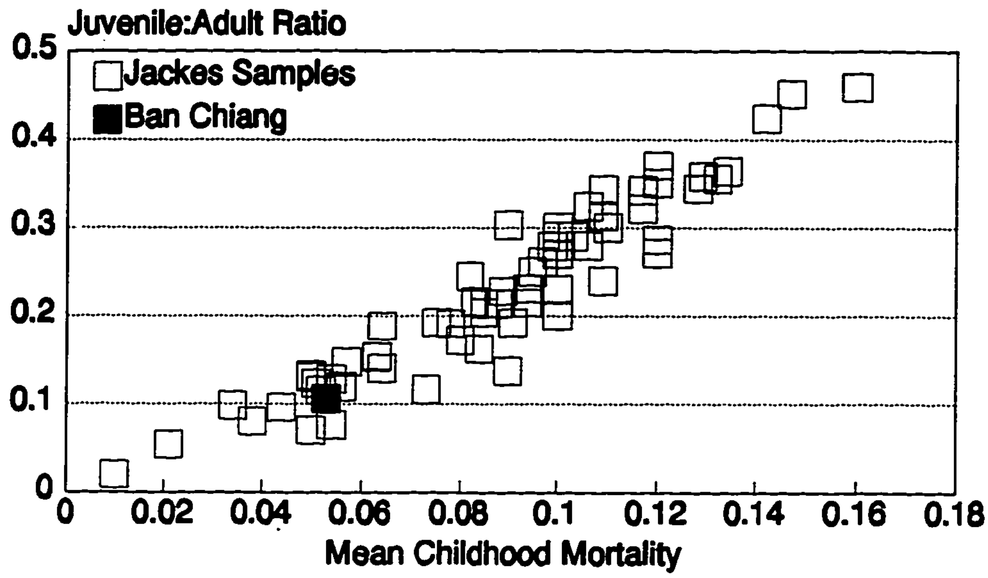


Figure 4.3. JA:MCM Plot of Ban Chiang

identify populations which are biased. The Ban Chiang sample, plotted on a graph of 60 archaeological and historical life table samples (Jackes 1992), falls fairly close to the general distribution, suggesting there is little bias (Figure 4.3). Its position at the lower end of this scatter plot suggests that the population was stationary or slightly decreasing. Fertility estimates can also be made using data from the JA, MCM, and known fertility in historic populations (Jackes 1994:179). Estimated fertility at Ban Chiang would be between 3 and 4 children.

Jackes (Ibid.) also suggests that the shape of the four juvenile mortality quotients (${}_5q_5$, ${}_5q_{10}$, ${}_5q_{15}$, ${}_5q_{20}$) can be compared, showing differences between populations under stress and those that are increasing. The shape of the Ban Chiang juvenile mortality is shown in Figure 4.4, along with juvenile mortality curves from the United Nations model life tables, representing South Asia with early childhood mortality, and a general mortality curve (Jackes, personal communication). These UN plots exhibit the "typical" shape of juvenile mortality and help to illustrate the rather skewed mortality in the Ban Chiang sample. The shape of the Ban Chiang plot suggests high childhood mortality consistent with high fertility, but also a high mortality in the 15-19.9 year interval which is typically a low mortality period of life, suggesting the skeletal sample is biased.

In summary, although the Ban Chiang skeletal sample has appreciable environmental and archaeological biases, plots of the JA and MCM show the sample is relatively fair, and is

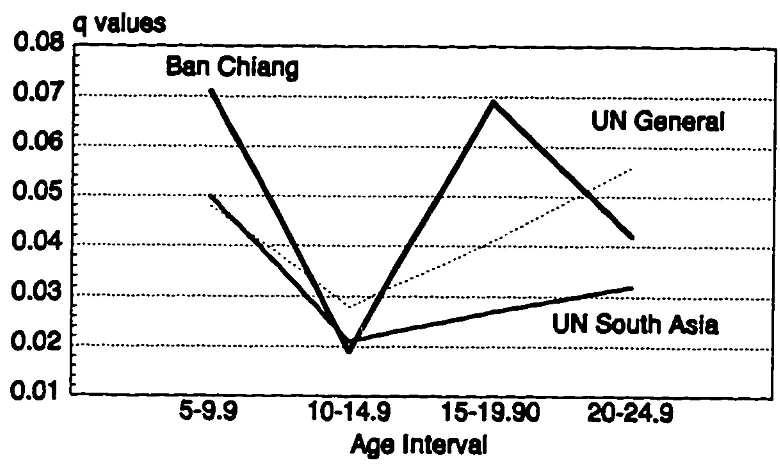


Figure 4.4. Juvenile Mortality at Ban Chiang

suggestive of a population that is slightly decreasing. Fertility is estimated at 3-4 children. The juvenile mortality quotients from Ban Chiang, however, do suggest there may be some recovery bias, perhaps based on differential burial areas, as they show a high mortality in adolescence.

Temporal Comparison

The Ban Chiang skeletal sample may be divided into early and later phases, following the archaeological evidence of burial orientation change at the Early Period IV-V interface (1600-1200 B.C.), to assess possible changes in mortality patterns over time. All of the mortality biases will be compounded because of the smaller samples. There are no absolutely clear archaeological considerations as to where the EP V burials should be placed - either as part of the early phase or part of the later phase (White-personal communication 1994). Although sample sizes are more even if the EP V burials are included with the early phase of the site, since many of the burials are designed EPV-MP VI, grouping them with the Middle Period seems appropriate. The Early Group at Ban Chiang includes the first four divisions of the Early Period (EP I - EP IV), while the Late Group includes the last Early Period (EP V), the Middle Periods (MP VI - MP VIII) and the Late Period (LP IX- LP X).

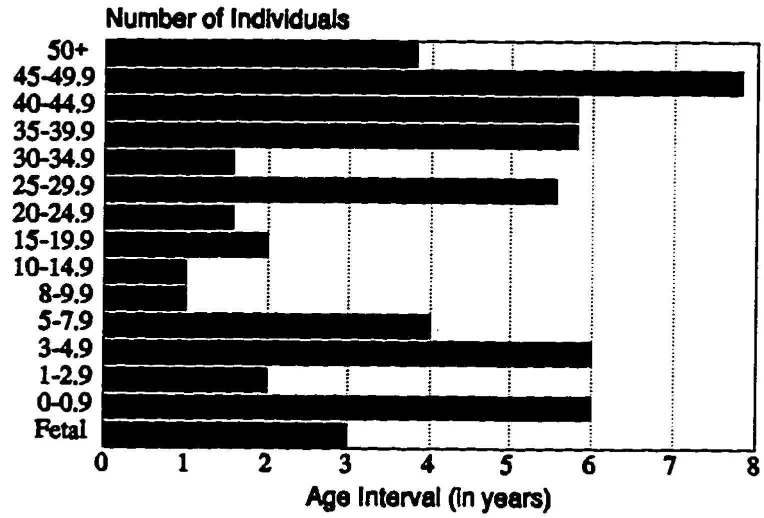


Figure 4.5. Age Distribution of Early Group Burials

Early Group

The Early Group skeletal sample (EP1-EPIV) contains 61 individuals, including three sets of fetal remains (Table B.2). Subadults (25/61) comprise 41.0% of the population, and 59.0% are adults (36/61), a distribution suggesting under-representation of adults in this phase of occupation. Nine adults have indeterminate age estimations. The sex ratio is slightly skewed toward males (28:24), but there are nine burials of unknown sex. In adults, the sex ratio is 19:16, an equivalent proportion. Visually, the age-at-death distribution of the Early Group at Ban Chiang duplicates the erratic pattern of the composite sample (Figure 4.5).

There are two peaks in the subadult population, one in the first year of life, and a second in the 3-5 year interval. This distribution was not evident in the composite sample. The peak at age 25-29.9, and the lack of older aged adults is, again, a reflection of the shortcomings of aging methods.

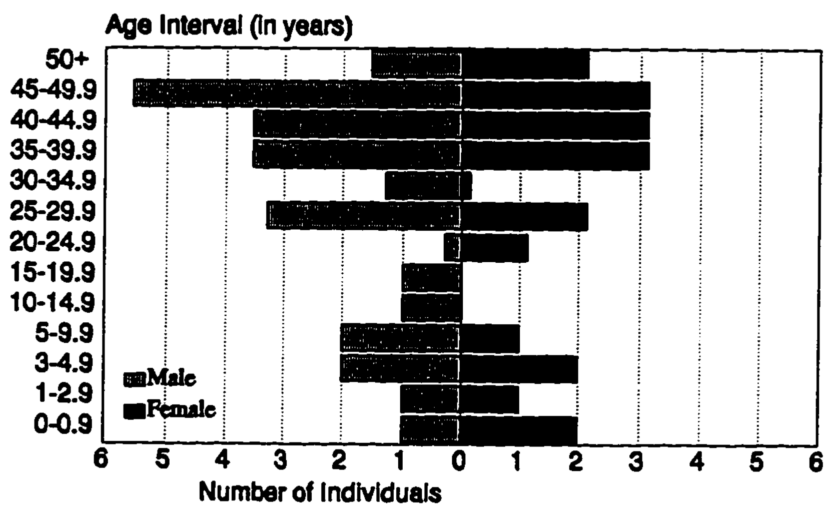


Figure 4.6. Sex and Age Distribution Early Group Burials

Examination of the Early Group age-at-death distribution by sex (including adults of indeterminate age), documents fairly even distribution, with slightly more males in the middle-age intervals (Figure 4.6). Female deaths are more frequent in early adulthood, while males are more numerous in the older age intervals. There appears to be little difference in the early childhood pattern of deaths.

Late Group

The Late Group sample at Ban Chiang (EPV-LPX) is comprised of 79 individuals, 25.3% are subadults (20/79), and 74.7% are adults (59/79), suggesting subadults are

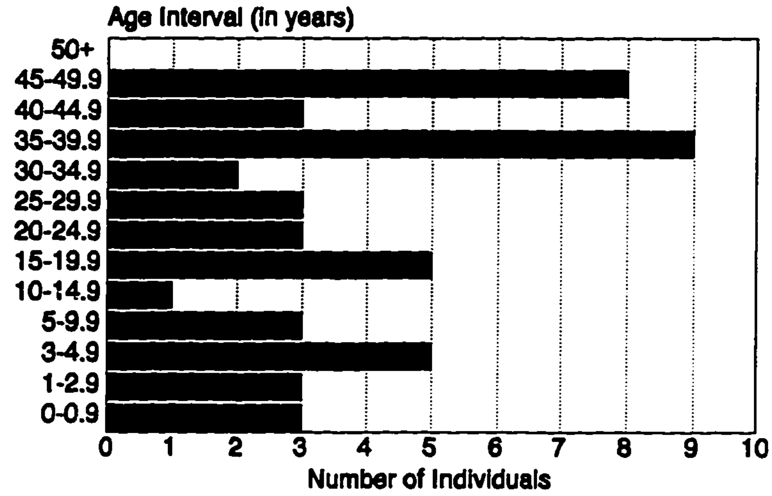


Figure 4.7. Age Distribution of Late Group Burials

under-represented (Table B.2). There are no individuals in the 50+ interval, however, 52.5% of the adults (31/59) have nonspecific age estimates. The sex ratio is nearly equal at 35:36, but sex could not be determined in eight of the burials.

The age distribution of this sample (Figure 4.7) documents a steady, relatively low level of infant and childhood deaths, with the highest frequency of deaths in middle-age (35-39.9, 45-49.9). This peak, as well as the absence of individuals 50+ years, are likely to be artifacts which can be attributed to aging methodologies used in archaeological skeletal samples (Jackes 1985).

To increase the sample size, more accurately assess sex differences, and smooth the distribution to some degree, the indeterminate aged adults are added in Figure 4.8. The highest frequency of deaths in females is in the early adult intervals, while males survive longer. The lack of females in the first year of life is likely to be related to the mortuary or sex estimation biases. The lack of young adult males, again, reflects an absence of warfare or ritualized violence.

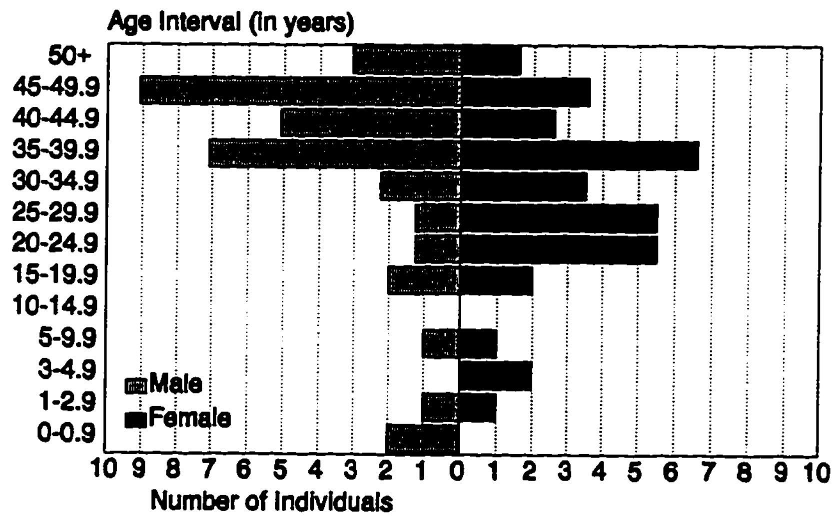


Figure 4.8. Age and Sex Distribution in Late Group Burials

Abridged life tables (after Jackes 1992) for the Early and Late Groups of the Ban Chiang skeletal series are presented in Tables B.3 and B.4. The demographic estimators of the phase subsamples (Table 4.3) suggest that there is a decrease in fertility in the later periods.

Table 4.3. Paleodemographic Estimators in Ban Chiang Skeletal Remains

Sample	N	MCM*	JA*	20+/5+†	Fertility‡
Combined	140	0.053	0.105	0.848	4
Early (EP I-EP IV)	61	0.064	0.136	0.818	5
Late (EP V-LP X)	79	0.046	0.068	0.868	2-3

* Jackes 1992. † Konigsberg et al. 1989. ‡ Jackes 1994.

Plotting the MCM and JA for the Early and Late Group subsamples, Figure 4.9, shows that all of the Ban Chiang samples fall near the center of the distribution, suggesting they are relatively unbiased. The lower end of the distribution suggests the population was stationary or decreasing (Jackes 1992:216). That the later sample falls nearer the lower end of the distribution is reflective of a decline in fertility.

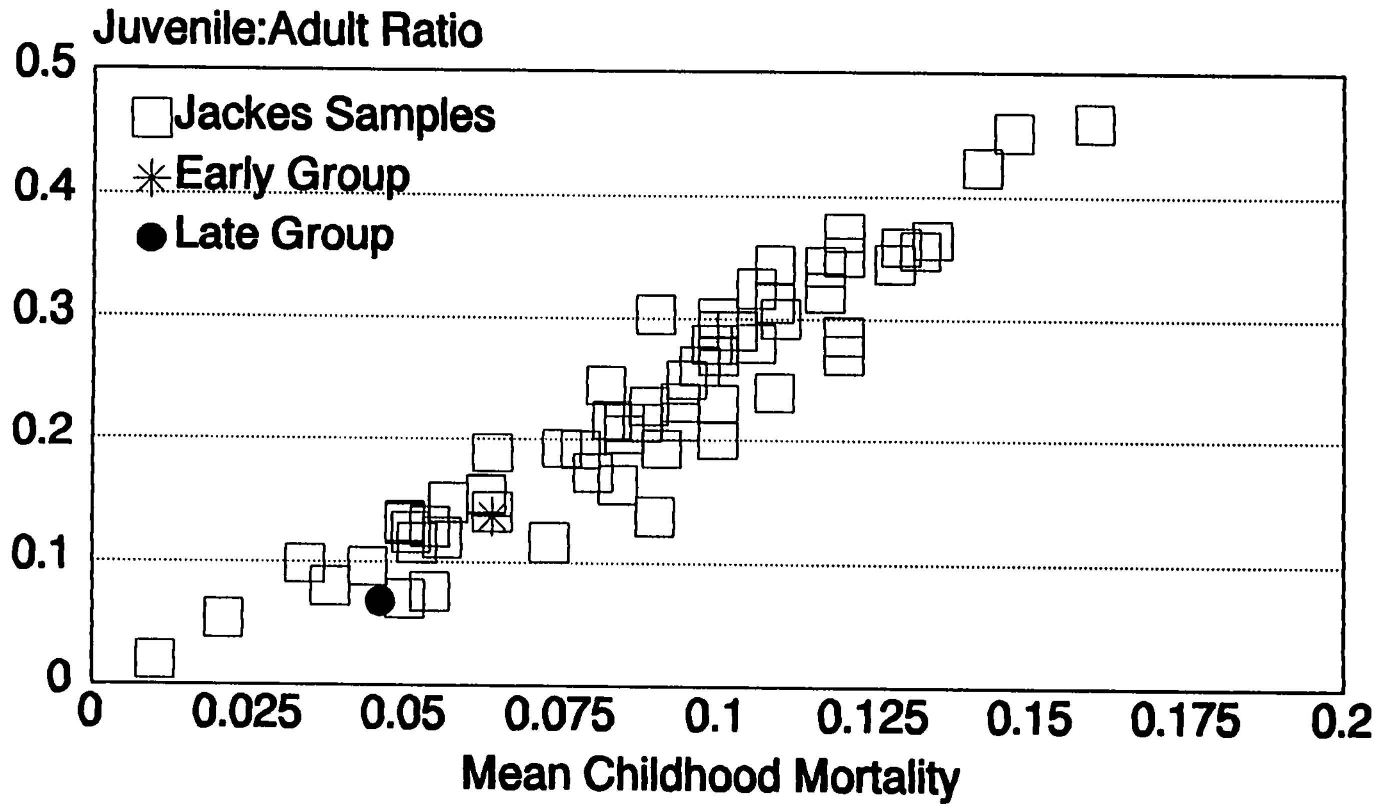


Figure 4.9. Temporal Changes in MCM:JA Plot

Examining the juvenile mortality in the Early and Late Groups at Ban Chiang, by plotting the four childhood *q* values, documents little difference in their shapes (Figure 4.10). Early childhood mortality is higher in the Early Group, while late adolescent mortality is higher in the Late Group.

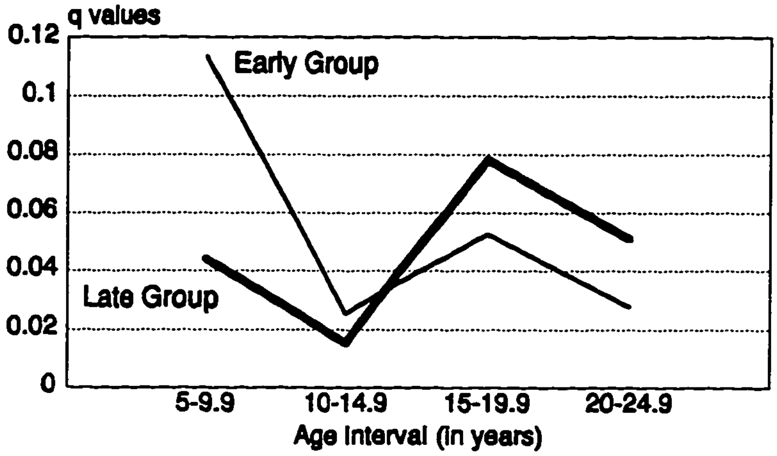


Figure 4.10. Juvenile Mortality Over Time

GROWTH

Subadult Diaphyseal Bone Length

The determination of "health" in skeletal populations often involves an assessement of "growth", with the presumption of slowed or delayed long limb bone growth relative to the less susceptible timing of dental calcification and/or eruption. Only 21 subadults from Ban Chiang had diaphyses of one or more of the major long limb bones (humerus, femur, tibia) and age estimates from dental criteria (See Tables A.5 and A.6). The most common diaphysis was the humerus (n=19), followed by the femur (n=15), and the tibia (n=8). Plotting the length of the diaphysis (either side, or the mean of the two) against the dental age estimates, results in a graphic image of the progress of growth in the skeletal sample.

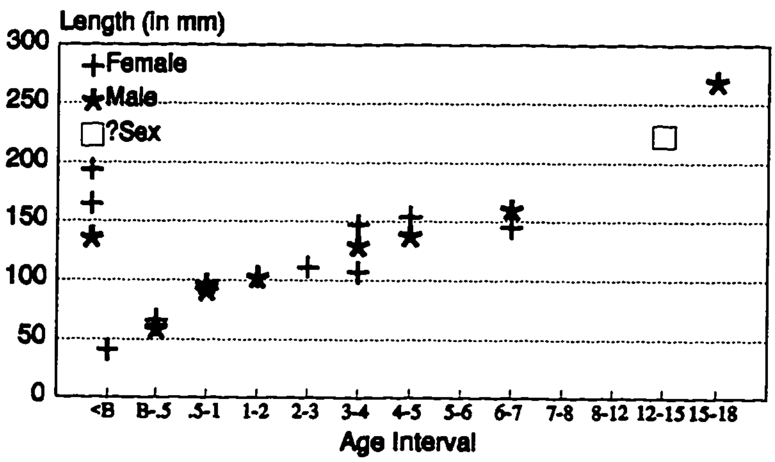


Figure 4.11. Humeral Diaphyseal Length vs Dental Age

In the humerus (Figure 4.11), there are no obvious differences between the sexes. After a steady increase in humeral diaphyseal length in the first year of life, there is an apparent plateau in growth in the 1-3 year age range, the curve flattens around the 100 mm mark. Then, at around age four years, diaphyseal length again increases rapidly to 160 mm at age 7 years.

The femoral diaphysis was the next most common element in the Ban Chiang subadult population (Figure 4.12). Again, there are no obvious differences between the female and male individuals in this series. As noted in the humeral diaphyseal length distribution, there is a flattening of the femoral diaphyseal length curve at approximately age three to six years, around 200 mm, after a fairly steady increase in length in the first two years of life.

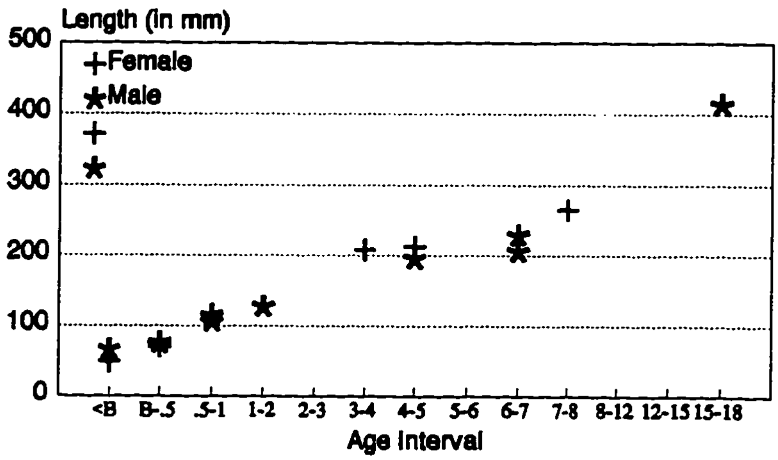


Figure 4.12. Femoral Diaphyseal Length vs Dental Age

The fewer numbers of tibial diaphyses present for Ban Chiang subadults, Figure 4.13, still exhibit no appreciable sex differences in growth versus dental age. In all cases, the sample sizes are quite small, and therefore conclusions should be tentative.

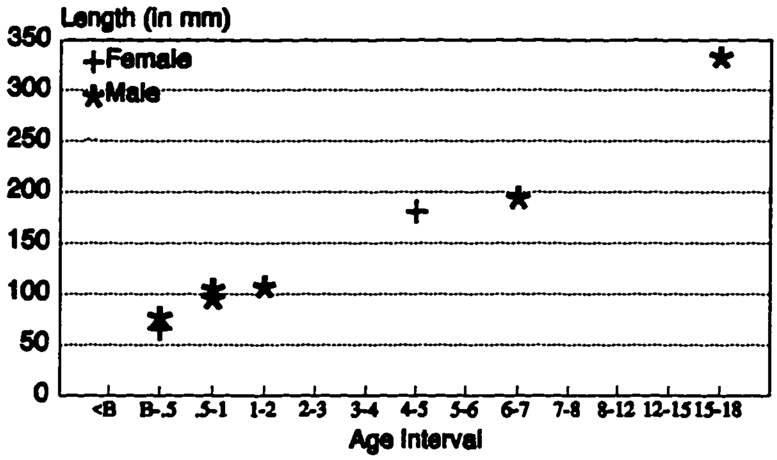


Figure 4.13. Tibial Diaphyseal Length vs Dental Age

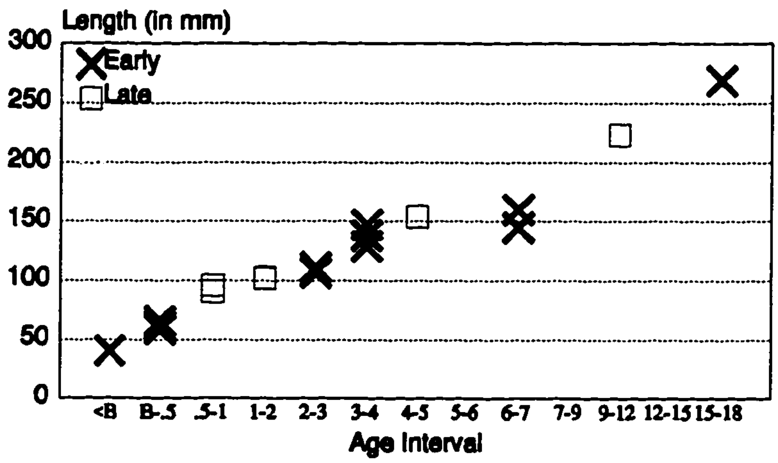


Figure 4.14. Humeral Diaphyseal Length Over Time

The small number of subadult individuals with both dental age assessments and major diaphyseal length measurements restricts our conclusions about subadult growth at Ban Chiang. However, there may be some temporal trend visible, even in these small samples. Using the humeral diaphysis since it is the most numerous, the length versus dental age in Early Group and Late Group subadults at Ban Chiang is plotted in Figure 4.14. The lack of individuals from the Early Group in the first year of life does not allow any conclusions about early growth of the humeral diaphyseal lengths. No obvious differences between the two phases are evident in this plot. Although not shown here, plots of the femoral and tibial diaphyseal lengths, are inconclusive primarily because the small sample sizes do no permit overlapping distributions.

Ban Chiang Adult Long Bone Length and Stature

It is well accepted that there has been a secular trend toward increased stature in mankind over time, and changes in stature have been used to infer the nutritional/health status of skeletal populations. Because stature is ultimately the result of an increase in any one or all of the components of the skeleton, it would be wise to examine individual long limb bone lengths. Kimura (1984) has found that the majority of the height increase in second-generation Japanese immigrants to the United States is found in an increased tibial length. Thus, by examining not only the final stature estimates, but lengths of the two major leg long limb bones, a trend in adult growth may be detected.

Statures calculated from the long limb bones of the leg and arm are itemized, by burial, in Tables B.5 - B.6. Calculations of mean stature do not include bone lengths estimated from segment measurements. The 29 male statures are estimated from the femur (12), humerus (6), fibula (4), forearm (4), and tibia (3). The 25 female statures are estimated from the femur (9), tibia (6), humerus (5), forearm (4), and fibula (1). Table 4.4 presents the mean statures combining all estimates using the same suite of formulae, but a variety of skeletal elements. Although two different stature calculations are shown, for the purposes of this discussion, the Thai-Chinese formulae (Sangvichien et al. 1985, nd) will be utilized, although the upper limb formulae are without standard error estimates.

Table 4.4. Mean Stature Estimates (in cm) in Ban Chiang Adults

Formulae*	Male				Female			
	n	Mean	SD	Range	n	Mean	SD	Range
Non-ethnic	29	166.8	5.4	157-180	25	156.5	5.5	145-166
Thai-Chinese	29	165.7	3.6	160-174	25	154.1	2.9	149-161

* Non-ethnic formulae (Sjøvold 1990), Thai-Chinese formulae (Sangvichien et al. 1985, nd). Note: n=number, SD=standard deviation.

The Thai-Chinese stature estimates are shorter, by one cm in males and 2.4 cm in females, than those generated from the non-ethnic formulae, but the standard deviations of the estimates are less. Both formulae show females were shorter than males by more than 10 mm. Comparing the range of statures between the sexes, the overlap in the non-ethnic stature estimates is 9 mm, while using the Thai-Chinese calculations only 1 mm of overlap is found. This result is expected since the non-ethnic formulae are also non-sex specific.

Unfortunately, preservation is a major factor in the reconstruction of stature and long limb bone lengths in the Ban Chiang population. To minimize the influence of individuals with both right and left elements preserved, only one element per person is used. In order to mitigate occupational effects on bone length, measurement of the left side was chosen preferentially, and in the absence of the left side, the right side is used. The numbers of bones available, and individuals represented, are summarized in Table 4.5.

Table 4.5. Complete Femora and Tibiae in Ban Chiang Adults

Period	Male			Female		
	Femora	Tibiae	Individuals	Femora	Tibiae	Individuals
EP 1						
EP 2	1		1	2	1	2
EP 3	5	4	5		1	1
EP 4	3	4	5	2	4	4
EP 5	1	1	1	2	3	3
MP 6	1	1	1	1	2	2
MP 7		4	4	2	2	3
MP 8						
LP 9						
LP 10	1	1	1			
Total Bones	12	15	18	9	13	15

The male femoral length sub-sample represents 12 individuals, while the tibia lengths represent 15 individuals. Together, the two bones represent 18 different individual males. Nine females are represented by femur lengths, 13 individuals by tibia lengths, and 15 individuals in the combined lengths. The overall means are presented in Table 4.6. The small sample sizes restrict any conclusions on sexual dimorphism, make evaluation of changes by period futile, and even restrict the power of conclusions based upon collapsing the temporal periods into phases.

Table 4.6. Mean Femoral and Tibial Lengths (in mm) in Ban Chiang Adults

Limb Bone	Male				Female			
	n	Mean	SD	Range	n	Mean	SD	Range
Femur	12	447.6	18.8	425-495	9	407.0	11.1	390-425
Tibia	15	376.7	13.3	354-398	13	346.2	9.3	335-368

Note: One femur/tibia length per person. n=number, SD=standard deviation.

Temporal Change

Examination of stature estimates over time may reveal a secular trend in the Ban Chiang adults. Table 4.7 presents the mean stature estimates in the Early and Late Group sub-samples. There is a slight decline in both male (166.0 cm : 165.4 cm), and female (154.7 cm : 153.7 cm) mean statures over time, however, the differences are not statistically significant.

Table 4.7. Mean Stature Estimates (in cm) in Ban Chiang Adults (By Group)

Formulae*	Group	Male				Female			
		n	Mean	SD	Test	n	Mean	SD	Test
Non-ethnic	Early	12	167.0	5.1	t=0.1474 p=0.8840	9	158.2	4.3	t=1.1086 p=0.2791
	Late	17	166.7	5.7		16	155.6	6.0	
Thai-Chinese	Early	12	166.0	3.6	t=0.4688 p=0.6429	9	154.7	2.0	t=0.7532 p=0.4589
	Late	17	165.4	3.7		16	153.7	3.4	

* Non-ethnic formulae (Sjøvold 1990), Thai-Chinese formulae (Sangvichien et al. 1985, nd). Note: n=number, SD=standard deviation.

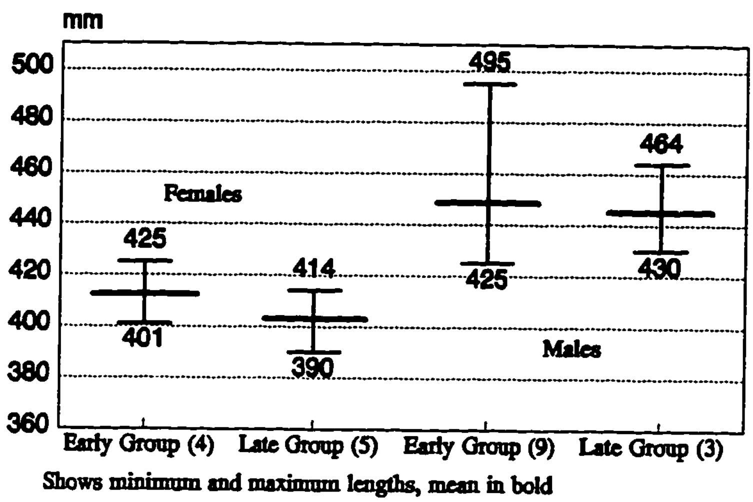


Figure 4.15. Comparison of Femoral Lengths Over Time

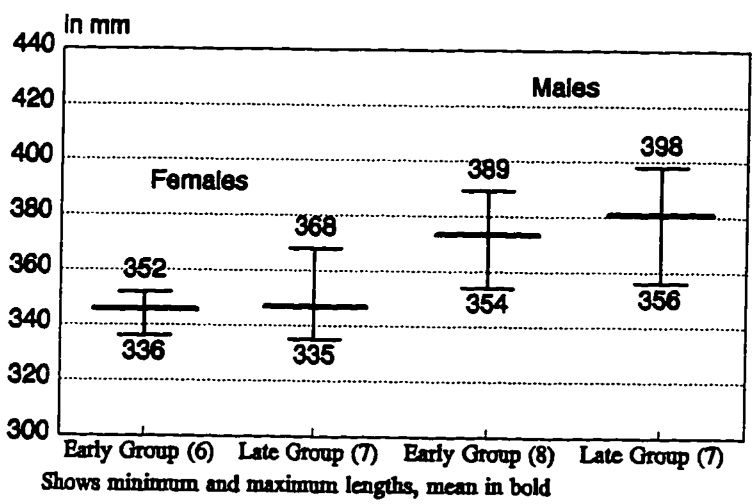


Figure 4.16. Mean Tibial Lengths Over Time

Visual examination of the femoral and tibial lengths in Ban Chiang adults over time, may also suggest a temporal trend. Femoral length appears to decline in both males and females in the Late Group (Figure 4.15). The presence of the Early Group male mean femur length at the lower end of the range suggests that the maximum length of 495 mm is an outlier, and is likely to account for the slightly higher mean length in the Early Group males relative to the Late Group males. A *Student's-t* test of the means reveals no significant difference in either males (t=0.2632, df 10, p=0.7977) or females (t=1.3298, df 7, p=0.2253).

Sample sizes of tibiae lengths are slightly larger and the lengths have a more restricted range than those of the femur (Figure 4.16). There is an apparent increase in the range of tibia lengths in the males and females of the later phase, with both reflecting higher maximum values. But the means of both phases, in both sexes, are nearly identical. A *Student's-t* test of the means reveals no significant difference (males t=-1.0917, df 13, p=0.2948; females t=-0.1943, df 11, p=0.8495).

Summary of Growth

In summary, the samples of diaphyseal lengths in Ban Chiang subadults are small and suggest a flattening in the growth curve at age 1-3 in the humerus and age 3-6 in the femur. Because there are very few subadults in the Late Group at Ban Chiang, evaluation of any temporal changes in subadult diaphyseal lengths relative to dental age are restricted.

In the adult skeletal sample, the male mean stature is greater than the female mean stature (165.7 cm : 154.1 cm [Sangvichien et al. 1985, nd]), with a slight overlap in range. Both sexes exhibit a slight decline in mean stature in the Late Group, but the difference is not statistically significant. Examining individual lengths of the major long bones bones of the leg reveals a slightly different pattern. In the femur, there is a decline in mean length in both males and females, as well as a decline in the minimum and maximum lengths over time (not statistically significant). In the tibia, however, the mean lengths are nearly equal in both sexes, but the range increases in the Late Group.

DENTAL ENAMEL HYPOPLASIA

Hypoplasia in the Ban Chiang permanent teeth is detailed in Tables B.7 and B.8. In individuals greater than 15 years of age, hypoplasias are noted in 10.1% (96/947) of the teeth observed. Linear enamel hypoplasias (LEH) are the most common type (6.3%, 60/947), followed by non-linear pitting defects (2.7%, 15/26) and the rare linear pitting and vertical groove defects (1.1%, 10/947) [Figure 4.17]. Hypoplasias are more common in the maxillary teeth (11.2%, 50/445) than the mandibular teeth (9.2%, 46/502), and as expected, are more prevalent in the canines (29.6%, 39/132) and incisors (13.6%, 26/191) than the posterior teeth (molars: 3.5%, 12/341; premolars: 6.7%, 19/283).

In individuals less than 15 years of age (N=10), LEH is noted in 15.6% of the teeth examined (Table 4.8). In these subadults LEH is more common in the maxillary teeth (18.7%) than the mandibular teeth (12.5%); and in the canines (70.0%, 7/10), followed by the premolars (13.3%, 2/15), incisors (12.1%, 4/33), and finally the molars (5.3%, 2/38). LEH are more common in the subadult male teeth (15.7%) than the female teeth (8.0%). By individual, these defects are occurring in one male (8/32 teeth), one female (2/3 teeth) and two unknown sex individuals (4/19 teeth, 1/1 tooth).

Table 4.8. LEH in Ban Chiang Subadult (<15 Years) Permanent Teeth

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/11	0/4	2/3	4/6	6/24	0/11	0/4	2/2	0/10	2/27	8/51
Female	1/7	0/2	0/1	0/6	1/16	1/4		0/1	0/4	1/9	2/25
? Sex	0/3	1/1	1/1	0/3	2/8	0/2	1/4	2/2	0/4	3/12	5/20
Total	1/21	1/7	3/5	4/15	9/48	1/17	1/8	4/5	0/18	6/48	15/96

Note: 10 individual burials (4 males, 4 females, 2 ?sex) are represented. M=molar, P=premolar, C=canine, I=incisor, LEH=linear enamel hypoplasia.

Examining the combined hypoplastic defects (omitting hypocalcification) in the Ban Chiang permanent teeth (>15 years), by sex (Table 4.9), documents a greater prevalence of hypoplasias in female teeth (11.3%, 51/451) than male teeth (8.9%, 42/470). A trend which is statistically significant in the mandible (bold cells), and is reversed in the maxillary teeth. The only "by tooth" gender difference which is significant is in the mandibular second molar.

Figure 4.17. Examples of Pitting and LEH Hypoplasia

Table 4.9. Prevalence of Hypoplasia, By Sex, in Ban Chiang Adult (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla M3	0/23	0.0	1/18	5.6	FET	0.439
M2	2/29	6.9	2/27	7.4	FET	1.000
M1	0/28	0.0	0/27	0.0		
P4	2/31	6.5	2/37	5.4	FET	1.000
P3	4/32	12.5	3/31	9.7	FET	1.000
C	7/26	26.9	7/32	21.9	χ^2=0.200	0.655
I2	6/25	24.0	5/24	20.8	χ^2=0.071	0.791
I1	4/25	16.0	2/19	10.5	FET	0.684
Total Maxillary Hypoplasia	25/219	11.4	22/215	10.2	χ^2=0.157	0.692
Mandible M3	1/25	4.0	1/22	4.5	FET	1.000
M2	**0/35**	**0.0**	**4/33**	**12.1**	**FET**	**0.050**
M1	0/34	0.0	1/32	3.1	FET	0.485
P4	0/40	0.0	3/34	8.8	FET	0.092
P3	1/38	2.6	4/32	12.5	FET	0.171
C	11/37	29.7	12/33	36.4	χ^2=0.348	0.555
I2	2/25	8.0	2/26	7.7	FET	1.000
I1	2/17	11.8	2/24	8.3	FET	1.000
Total Mandibular Hypoplasia	**17/251**	**6.8**	**29/236**	**12.3**	**χ^2=4.326**	**0.038**
Total Hypoplasia	42/470	8.9	51/451	11.3	χ^2=1.426	0.232

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 63 individuals: 31 males, 32 females; 59 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Linear Enamel Hypoplasia

Separating the linear defects from the pitting defects (Table 4.10), female teeth overall have a greater prevalence of pitting defects (23/451, 5.1%) than male teeth (1.7%, 8/470). The incidence of LEH in male teeth 6.2% (29/470), is identical to that in female teeth (6.2%, 28/451). The highest occurrence of pitting defects is in the female maxillary canines (15.8%).

Table 4.10. Distribution of Hypoplasias in Ban Chiang Permanent Teeth (>15 years) By Type

Tooth Class/ Hypoplasia Type	Maxilla				Mandible			
	Male		Female		Male		Female	
	A/O	%	A/O	%	A/O	%	A/O	%
Molars LEH	2/80	2.5	3/72	4.2	1/94	1.1	3/87	3.4
pitting defects	0/80	0.0	0/72	0.0	0/94	0.0	3/87	3.4
Premolars LEH	4/63	6.3	3/68	4.4	1/78	1.3	1/66	1.5
pitting defects	0/63	0.0	2/68	2.9	0/78	0.0	6/66	9.1
Canines LEH	4/26	15.4	2/32	6.3	7/37	18.9	8/33	24.2
pitting defects	2/26	7.7	5/32	15.6	4/37	10.8	4/33	12.1
Incisors LEH	9/50	18.0	5/43	11.6	3/42	7.1	4/50	8.0
pitting defects	0/50	0.0	2/43	4.7	1/42	2.4	0/50	0.0
Total LEH	19/219	8.7	13/215	6.1	10/251	4.0	15/236	6.4
pitting defects	2/219	0.9	9/215	4.2	6/251	2.4	14/236	5.9

Note: Hypocalcification and vertical grooves are omitted, pitting includes non-linear pits, linear pits and single pits, A=affected, O=observed, LEH=linear enamel hypoplasia. Includes 63 individuals: 31 males, 32 females.

Examining only the occurrence of LEH, by sex, in the adult permanent teeth from Ban Chiang (Table 4.11) shows no significant sex differences in any of the tooth classes. Male teeth (8.7%) have more LEH defects in the maxilla than female teeth (6.0%), while female teeth (8.1% : 7.0%) have more in the mandible, but the overall prevalence of LEH is identical (6.0% : 6.2%). This pattern directly mirrors that found in the distribution of all hypoplasias (See Table 4.9).

Table 4.11. Prevalence of LEH, By Sex, in Ban Chiang (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	2/80	2.5	3/72	4.2	FET	0.668
Premolars	4/63	6.3	3/68	4.4	FET	0.710
Canines	4/26	15.4	2/32	6.3	FET	0.393
Incisors	9/50	18.0	5/43	11.6	χ^2=0.734	0.392
Total Maxillary Hypoplasia	19/219	8.7	13/215	6.0	χ^2=1.098	0.295
Mandible Molars	0/94	0.0	3/87	3.4	FET	0.109
Premolars	0/78	0.0	0/66	0.0		
Canines	7/37	18.9	8/33	24.2	χ^2=0.294	0.588
Incisors	3/42	7.1	4/50	8.0	FET	1.000
Total Mandibular Hypoplasia	10/251	4.0	15/236	6.4	χ^2=1.405	0.236
Total Hypoplasia	29/470	6.2	28/451	6.2	χ^2=0.001	0.981

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 64 individuals: 31 males, 32 females; 59 adults (>20 years), 4 adolescents (15-20 years).

Hypoplastic Pitting

The other type of hypoplastic defect noted at Ban Chiang are pitting defects. These defects may be linear, non-linear or single pits, although the latter two varieties are uncommon in this sample. There are significant sex differences in the prevalence of pitting at Ban Chiang (Table 4.12) Hypoplastic pitting is more common in the female maxillary (4.2% : 0.9%), mandibular (5.9% : 2.4%) and total teeth (5.1% : 1.7%) than in male teeth. Pitting defects are concentrated in the canines of both jaws and the mandibular premolars.

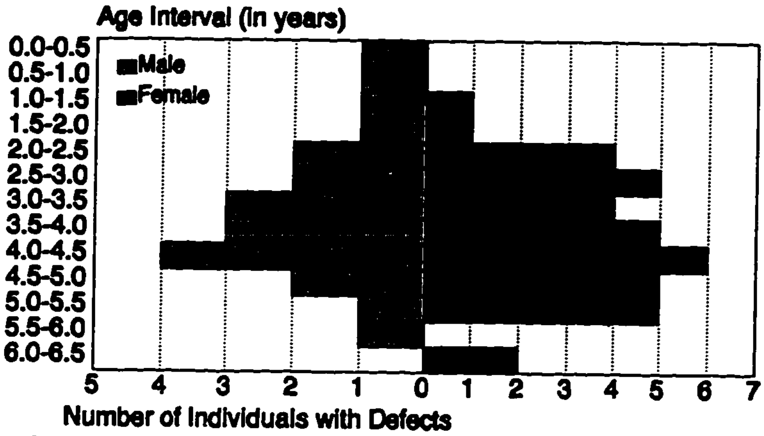
Table 4.12. Prevalence of Hypoplastic Pitting, By Sex, in Ban Chiang (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	0/80	0.0	0/72	0.0		
Premolars	0/63	0.0	2/66	2.9	FET	0.497
Canines	2/26	7.7	5/32	15.6	FET	0.442
Incisors	0/50	0.0	2/43	4.7	FET	0.211
Total Maxillary Pitting	**2/219**	**0.9**	**9/215**	**4.2**	χ^2**=4.704**	**0.030**
Mandible Molars	1/94	1.1	3/87	3.4	FET	0.352
Premolars	**0/78**	**0.0**	**7/66**	**10.6**	**FET**	**0.0035**
Canines	4/37	10.8	4/33	12.1	FET	1.000
Incisors	1/42	2.4	0/50	0.0	FET	0.457
Total Mandibular Pitting	**6/251**	**2.4**	**14/236**	**5.9**	χ^2**=3.874**	**0.049**
Total Pitting	**8/470**	**1.7**	**23/451**	**5.1**	χ^2**=8.168**	**0.004**

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 64 individuals: 31 males, 32 females; 59 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Age-At-Occurrence

Measurements of the distance from the cemento-enamel junction to the hypoplastic defects in the permanent teeth of 21 individuals from Ban Chiang are presented in Table B.9. Both linear and pitting defects were measured and are distinguished in this table, but are combined in this analysis. Of these 21 individuals, most (18/21, 85.7%) had defects in more than one tooth, ranging in frequency from one to a maximum of four lines per tooth.



Note: Includes all teeth

Figure 4.18. Enamel Hypoplasias in Ban Chiang Permanent Teeth

The age distribution of the enamel defects by sex (Figure 4.18), shows a peak prevalence at 4.0-4.5 years (4 individuals) in males, with two secondary peaks at the 3.0-3.5 and 3.5-4.0 intervals. In females, no defects are noted in the first year, followed by a rapid increase in defects at age 2.0 years, with a peak similar to the males at age 4.0-4.5 years (6 individuals). Prevalence of defects occurring at age 4.5-5 years remains high in females (5 individuals), while in males, the number of indi· .duals affected drops rapidly.

Using only the canine teeth, and evaluating only LEH defects, the mean age-at-occurrence in Ban Chiang males (n=6 individuals) is 4.33 years (SD=0.600), and in females (n=4 individuals) the mean age-at-occurrence is 4.48 years (SD=0.466). This difference in timing of occurrence in hypoplasia incidence is not statistically significant (t=0.6675, df=20).

Table 4.13. Prevalence of LEH, By Sex and Group in Permanent Teeth (>15 years) from Ban Chiang

(# of Individuals) Affected/Observed Jaw/Tooth Class		Early Group (EP I - IV)						Late Group (MP V - LP X)					
		Male (14)		Female (13)		Statistic		Male (17)		Female (19)		Statistic	
		A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla	Molars	0/53	0.0	0/20	0.0			2/27	7.4	3/52	5.8	FET	1.000
	Premolars	3/45	6.7	1/25	4.0	FET	1.000	1/18	5.6	2/43	4.7	FET	1.000
	Canines	2/18	11.1	0/16	0.0	FET	0.487	2/8	25.0	2/16	12.5	FET	0.578
	Incisors	8/37	21.6	2/15	13.3	FET	0.704	1/13	7.7	3/28	10.7	FET	1.000
Total Maxillary LEH		13/153	8.5	3/76	3.9	χ^2=1.617	0.203	6/66	9.1	10/139	7.2	χ^2=0.224	0.636
Mandible	Molars	0/51	0.0	0/34	0.0			0/43	0.0	3/53	5.7	FET	0.250
	Premolars	0/40	0.0	0/28	0.0			0/38	0.0	0/38	0.0		
	Canines	5/19	26.3	5/16	31.3	FET	1.000	2/18	11.1	3/17	17.7	FET	0.658
	Incisors	3/22	13.6	0/13	0.0	FET	0.279	0/20	0.0	4/37	10.8	FET	0.286
Total Mandibular LEH		8/132	6.1	5/91	5.5	χ^2=0.031	0.859	**2/119**	**1.7**	**10/145**	**6.9**	**χ^2=4.098**	**0.043**
Total LEH		21/285	7.4	8/167	4.8	χ^2=1.166	0.280	8/185	4.3	20/284	7.0	χ^2=1.474	0.225

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10).

Ban Chiang Hypoplasias By Group

The most common types of dental enamel hypoplasia in the Ban Chiang adult permanent teeth are linear enamel hypoplasia (LEH) and pitting defects. In examining these defects over time, each class of defect will be examined for sex differences within each phase, changes over time within each sex, and finally overall change over time.

LEH Over Time

The only type of hypoplasia found in the Ban Chiang subadult (<15 years) permanent teeth is LEH. Although there were few sex differences in the adult sample at Ban Chiang, it is useful to know of any sex differences in the Early and Late Group sub-samples. Table 4.13 summarizes these frequencies and the statistical tests for sex differences within each phase. There are no statistically significant sex differences in the Early Group teeth, with male teeth (7.4%) more often affected than female teeth (4.8%). In the Late Group the situation is reversed: female teeth have more LEH (7.0% : 4.3%), with a statistically significant sex difference in the Late Group summed mandibular teeth (bold cells).

It is interesting that contrasting the Early Group male LEH frequency (7.4%) with the Late Group male LEH (4.3%) reverses the trend in the female frequencies (4.8% : 7.0%). The sexes trade places. Statistical tests of the male and female frequencies, by phase, indicate the differences are not significant (χ^2=1.796, p=0.180; χ^2=0.916, p=0.339 respectively). If the subadults are added to increase sample sizes, Table 4.14, the decrease in LEH in male teeth between the Early and Late Group is statistically significant.

Collapsing the sexes and examining phase differences in LEH prevalence using all of the available permanent teeth (Table 4.15), documents a significant increase in LEH in the molars and a significant decrease in LEH in the incisor teeth. The increase in affected molars and decrease in incisors, suggests that physiological insult may be occurring later in the life cycle in the Late Group compared to the Early Group. Overall, LEH prevalence is slightly greater in the Early Group (7.5% : 6.9%).

Table 4.14. Summary of LEH Prevalence by Sex and Group in All Ban Chiang Permanent Teeth

Sex/Jaw		Early Group (EP I-IV)		Late Group (EP V-LP X)		Statistic	
		A/O	%	A/O	%	Test	*p*
Male	Maxilla	19/176	10.8	6/67	9.0	χ^2=0.178	0.673
	Mandible	**10/155**	**6.5**	**2/123**	**1.6**	**χ^2=3.867**	**0.049**
	Total	**29/331**	**8.8**	**8/190**	**4.2**	**χ^2=3.789**	**0.052**
Female	Maxilla	3/84	3.6	11/147	7.5	χ^2=1.437	0.231
	Mandible	5/94	5.3	11/151	7.3	χ^2=0.367	0.545
	Total	8/178	4.5	22/298	7.4	χ^2=1.574	0.210

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 71 individuals: 35 males, 36 females; 32 Early Group, 39 Late Group. **Bold** indicates statistical significance (α=0.10).

Table 4.15. Summary of LEH Prevalence by Group in All Ban Chiang Permanent Teeth

Teeth	Early Group (EP I-IV)		Late Group (EP V-LP X)		Statistic	
	A/O	%	A/O	%	Test	*p*
Maxilla	25/271	9.2	19/222	8.6	χ^2=0.067	0.796
Mandible	15/264	5.7	16/286	5.6	χ^2=0.002	0.965
All Molars	**0/191**	**0.0**	**10/188**	**5.3**	**FET**	**0.007**
All Premolars	4/154	2.6	5/144	3.5	FET	0.743
All Canines	18/78	23.1	12/64	18.8	χ^2=0.395	0.530
All Incisors	**18/112**	**16.1**	**8/112**	**7.1**	χ^2=4.351	**0.037**
All Teeth	40/535	7.5	35/508	6.9	χ^2=0.134	0.714

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 74 individuals: 35 males, 36 females, 3 ?sex. **Bold** indicates statistical significance (α=0.10).

Table 4.16. Prevalence of Hypoplastic Pitting, By Sex and Group in Permanent Teeth (>15 years) from Ban Chiang

(# of Individuals) Affected/Observed Jaw/Tooth Class	Early Group (EP I - IV)						Late Group (MP V - LP X)					
	Male (14)		Female (13)		Statistic		Male (17)		Female (19)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla Molars	0/53	0.0	0/20	0.0			0/27	0.0	0/52	0.0		
Premolars	0/45	0.0	0/25	0.0			0/18	0.0	2/43	4.7	FET	1.000
Canines	2/18	11.1	5/16	31.3	FET	0.214	0/8	0.0	0/16	0.0		
Incisors	0/37	0.0	0/15	0.0			0/13	0.0	2/28	7.1	FET	1.000
Total Maxillary Pitting	**2/153**	**1.3**	**5/76**	**6.6**	**FET**	**0.042**	0/66	0.0	4/139	2.9	FET	0.308
Mandible Molars	**0/51**	**0.0**	**3/34**	**8.8**	**FET**	**0.061**	1/43	2.3	0/53	0.0	FET	0.488
Premolars	**0/40**	**0.0**	**5/28**	**17.9**	**FET**	**0.009**	0/38	0.0	2/38	5.3	FET	0.493
Canines	**0/19**	**0.0**	**3/16**	**18.8**	**FET**	**0.086**	4/18	22.2	1/17	5.9	FET	0.338
Incisors	0/22	0.0	0/13	0.0			1/20	5.0	0/37	0.0	FET	0.351
Total Mandibular Pitting	**0/132**	**0.0**	**11/91**	**12.1**	**FET**	**0.000**	6/119	5.0	3/145	2.1	FET	0.307
Total Pitting	**2/285**	**0.7**	**16/167**	**9.6**	**χ^2=21.71**	**0.000**	6/185	3.2	7/284	2.5	χ^2=0.252	0.616

Note: FET=Fisher's Exact Test (two-tailed probabilities).

Pitting Hypoplasia Over Time

Significant sex differences in the prevalence of pitting hypoplasis in the adult permanent teeth from Ban Chiang were suggested in the whole dental sample. Pitting hypoplasias are more common in female maxillary, mandibular and all teeth combined. Examining the distribution of pitting defects by phase as well as sex (Table 4.16), there are significant sex differences in the Early Group but not in the Late Group. The prevalence of hypoplastic pitting in the Late Group female teeth (2.5%) is significantly (χ^2=11.003, df=1) less than that in the Early Group (9.6%), while male tooth pitting increases from the Early (0.7%) to the Late Group (3.2%). This difference is also statistically significant (FET p=0.045).

When the sexes are combined (Table 4.17) there is no significant difference in prevalence of hypoplastic pitting between the Early (3.8%) and Late (2.8 %) Group summed teeth. Although the frequency of pitting declines in all tooth classes in the Late Group, the difference is significant only in the molars and incisors.

Table 4.17. Summary of Pitting Hypoplasias by Group in Adult Ban Chiang Permanent Teeth

Teeth	Early Group (EP I-IV)		Late Group (EP V-LP X)		Statistic	
	A/O	%	A/O	%	Test	p
Maxilla	7/240	2.9	4/205	2.0	χ^2=0.427	0.513
Mandible	11/238	4.6	9/264	3.4	χ^2=0.481	0.488
All Molars	**3/166**	**1.8**	**1/175**	**0.6**	**FET**	**0.360**
All Premolars	5/146	3.4	4/137	2.9	FET	1.000
All Canines	10/73	13.7	5/59	8.5	χ^2=0.884	0.347
All Incisors	**0/93**	**0.0**	**3/98**	**3.1**	**FET**	**0.247**
All Teeth	18/478	3.8	13/469	2.8	χ^2=0.738	0.390

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 64 individuals: 31 males, 32 females, 1 ?sex. **Bold** indicates statistical significance (α=0.10).

Age-At-Occurrence Over Time

The distribution of enamel hypoplastic defects over time, shown in Figure 4.18, shows evidence of a slightly different pattern of age-at-occurrence. In the Early Group, the distribution peaks at age 2.5-3.5 (4 individuals each), with another, smaller peak at age 4.0-5.0 years. In the Late Group, the peak occurs later, age 3.5-4.5 years and defects continue to be seen until age 7 years.

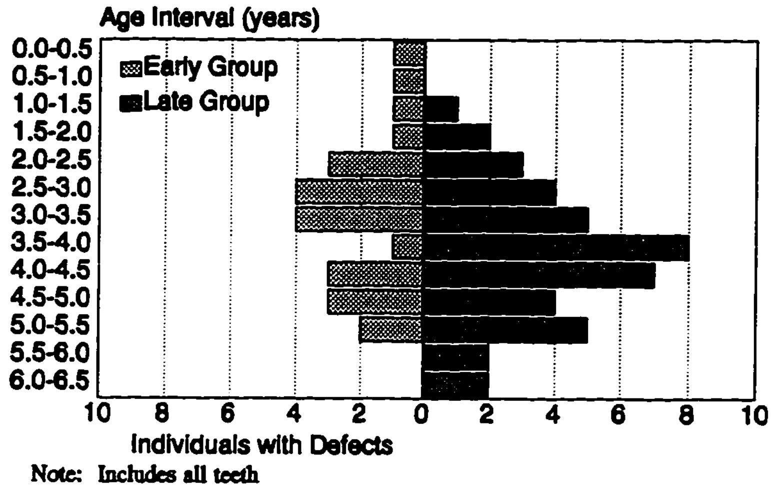


Figure 4.19. Dental Hypoplasias, By Group

Examining only the canine teeth, and the presence of LEH, in the Early Group, the mean age-at-occurrence (n=6 persons) is 3.93 years, SD=1.16; while in the Late Group, the mean is 4.34 years, SD=0.654. This difference is not statistically significant (t=1.1433, df=25).

Summary of Hypoplasia

Hypoplasias are noted in 10.1% (96/947) of the permanent teeth in individuals >15 years, and in 15.6% (15/96) of permanent teeth in subadults (<15 years of age). Hypoplasias are more common in the maxillary teeth than in the mandibular teeth. There are few significant sex differences in the prevalence of hypoplasias, with female teeth more commonly affected (11.3%, 51/451) than male teeth (8.9%, 42/470).

Linear enamel hypoplasia (LEH) is the most common type of hypoplasia, followed by non-linear pits, and rare occurrences of vertical grooving, single pits, and linear pits. In comparing LEH and pitting defects by sex, it is noteworthy that female teeth (5.1%) have more pitting defects than male teeth (1.7%), while the prevalence of LEH is identical (6.2%). Measurement of the location of LEH in 21 adults shows a slightly different pattern of age-at-occurrence in males and females. In males, the peak frequency occurs at age 4-4.5, in females the peak is from age 2-4 years.

Temporal changes in Ban Chiang hypoplasias are demonstrated in the frequency of LEH, which is declining in the Late Group in male teeth (7.4% : 4.3%), and is increasing in the Late Group in female teeth (4.8% : 7.0%). These differences are not statistically significant, and serve to cancel each other out when the sexes are combined. In the combined tooth sample, there is a slight decline in the frequency of LEH in all teeth (7.5% : 6.9%), but there is a significant increase in Late Group molars, and a significant decrease in the incisors. This suggests a shift toward a later age-at-occurrence in the Late Group, a trend supported by examination of the estimated age-at-occurrence in a subsample of Ban Chiang adults.

Pitting defects of the dental enamel are more common in female teeth (9.6%) than male teeth (0.7%) in the Early Group at Ban Chiang. This is a significant difference which disappears in the Late Group (2.5% : 3.2%), along with an overall decline in the frequency of pitting defects (3.8% : 2.8%). Thus, dental enamel hypoplastic defects decline in the Late Group at Ban Chiang, although the difference is not statistically signficant, and may only reflect sample size problems.

INDICATORS OF ANEMIA

In this section, the traditionally evaluated locales for evidence of porotic hyperostosis: cranial vault and orbital roofs, will be assessed; as well as evaluation of the overall thickness of the cranial vault bones. Additional possible evidence of anemia is found in the presence of enlarged nutritent foramina of the metatarsal bones in both adults and subadults.

Cribra Orbitalia

One of the primary indicators of iron deficiency anemia in human skeletal remains has been the presence of cribra orbitalia. This indicator has been scored as present or absent, by the size of the pores, and whether in an active or healing state. In the literature a clear definition of "healing" cribra orbitalia is in dispute. The size of the porosis, and the amount of coalescence, might suggest early vs mature vs healing bone, but it may be difficult to distinguish between the onset of the porosis (i.e. small openings) and a healing porosis. If the assumption is made that active cribra orbitalia is raised off the level of the cortex, then there are no cases in these remains. In any event, the lesions of cribra orbitalia, recognized as porosis of the orbital roof, or residual pitting of the orbital roof, were scored as present or absent and notations made about its attributes (See Table B.10 and B.11).

In adult individuals (>15 years of age), cribra orbitalia is noted in seven (15.2%) of the orbits examined (Table 4.18). Cribra orbitalia occurs more often in female orbits (23.8%) than male orbits (8.0%), a difference not statistically significant (FET p=0.142). When the

Table 4.18. Frequency of Occurrence of Cribra Orbitalia in Adults and Subadults from Ban Chiang, Thailand (Per Orbit and Per Individual)

A/O %	Cribra Orbitalia Per Orbit*																
	Adults						Subadults								Total	
	Male		Female		Total		Male		Female		?Sex		Total			
Absent	23/25	92.0	16/21	76.2	39/46	84.8	6/8	75.0	2/8	25.0	5/7	71.4	13/23	56.5	52/69	75.3
Present	2/25	8.0	5/21	23.8	7/46	15.2	2/8	25.0	6/8	75.0	2/7	28.6	10/23	43.5	17/69	24.6

A/O %	Cribra Orbitalia Per Individual															
	Adults						Subadults								Total	
	Male		Female		Total		Male		Female		?Sex		Total			
Absent	15/17	88.2	11/15	73.3	26/32	81.3	5/6	83.3	1/5	20.0	3/4	75.0	9/15	60.0	61/73	83.6
Present	2/17	11.8	4/15	26.7	6/32	18.8	1/6	16.7	4/5	80.0	1/4	25.0	6/15	40.0	12/73	16.4

Includes: 32 adults (17 males, 15 females) and 15 subadults (6 males, 5 females, 4 ?sex). A=affected, O=observed. *Right and left sides combined.

same data are examined by individual, females (4/15, 26.7%) again demonstrate a greater prevalence than males (2/17, 11.8%), but the difference does not reach statistical significance (FET p=0.383).

In the Ban Chiang subadult sample there is a large component of ?sex individuals which will complicate any sex conclusions. Cribra orbitalia is present in 25.0% of subadult male orbits and 75.0% of subadult female orbits. Similarly large sex differences are evident in the per individual analysis where 80% of female subadults are affected and 16.7% of males. Both of these differences are statistically significant (FET p=0.066 and FET p=0.080 respectively), but the relatively high prevalence in the ?sex sample mitigates the difference. The total prevalence of cribra orbitalia in the Ban Chiang subadults is 43.5% of orbits observed and 40.0% of individuals.

Combining the adults and subadults, the per orbit prevalence of cribra orbitalia at Ban Chiang is 24.6% (17/69), and the per person prevalence is 16.4% (12/73). None on the cases of cribra orbitalia is noted to be raised above the cortical surface; in the adults, two orbits (one individual) were noted as "trace", or pitting without perforations of the orbital roof.

Temporal Changes in Cribra Orbitalia

Examining the presence of cribra orbitalia in adults at Ban Chiang over time (Table 4.19), the greater prevalence in females is maintained in the phase sub-samples. In the Early Group, there are no observed cases in males, while in females 12.5% of orbits and 16.7% of individuals are affected. In the Late Group, two male orbits (25.0%) in two male individuals (33.3%) are affected compared to 30.8% female orbits in 33.3% of female individuals.

The prevalence of cribra orbitalia (by orbits and individuals) increases significantly in the Late Group at Ban Chiang. While there is an increase in both male and female orbits, the increase is statistically significant only in the adult male orbits (0.0% : 25.0%).

Table 4.19. Temporal Change in Cribra Orbitalia Prevalence in Ban Chiang Adults

A/O %	Cribra Orbitalia in Adult Orbits*						
	Male		Female		Total		Statistic
Early	**0/17**	**0.0**	1/8	12.5	**1/25**	**4.0**	FET p=0.320
Late	**2/8**	**25.0**	4/13	30.8	**6/21**	**28.6**	FET p=1.000
Statistic	**FET p=0.093**		FET p=0.606		**FET p=0.028**		

A/O %	Cribra Oribitalia in Adult Individuals						
	Male		Female		Total		Statistic
Early	0/11	0.0	1/6	16.7	**1/17**	**5.9**	FET p=0.353
Late	2/6	33.3	3/9	33.3	**5/15**	**33.3**	FET p=1.000
Statistic	FET p=0.110		FET p=0.604		**FET p=0.076**		

Note: A=affected, O=observed. **Bold** indicates statistical significance (α=0.10). * Right and left sides combined.

In the Ban Chiang subadults (Table 4.20), the prevalence of cribra orbitalia decreases in the Late Group (58.3% : 27.3% orbits; 50.0% : 28.6% individuals), but without statistical significance. Although the prevalence in males and females decreases in the Late Group (neither significantly), the prevalence in the ?sex sample increases. The prevalence in females is greater than in males in each phase as well, but, again, the differences are not statistically significant.

Table 4.20. Temporal Change in Cribra Orbitalia Prevalence in Ban Chiang Subadults

Group A/O %	Cribra Orbitalia in Subadult Orbits*								
	Male		Female		Test	?Sex		Total	
Early	2/4	50.0	5/5	100.0	FET p=0.167	0/3	0.0	7/12	58.3
Late	0/4	0.0	1/3	33.3	FET p=0.429	2/4	50.0	3/11	27.3
	FET p=0.429		FET p=0.107			FET p=0.429		FET p=0.214	

Group A/O %	Cribra Oribitalia in 15 Subadult Individuals								
	Male		Female		Test	?Sex		Total	
Early	1/3	33.3	3/3	100.0	FET p=0.400	0/2	0.0	4/8	50.0
Late	0/3	0.0	1/2	50.0	FET p=0.400	1/2	50.0	2/7	28.6
	FET p=1.000		FET p=0.400			FET p=1.000		FET p=0.608	

Note: A=affected, O=Observed, FET=Fisher's Exact Test (two-tailed probabilities). * Right and left sides combined.

Finally, combining the adult and subadult samples, there are no statistically significant differences in the prevalence of cribra orbitalia (either by orbit or individual) over time (Table 4.21). The overall prevalence in the Early Group is 21.6% orbits and 20.0% of individuals, with a slight increase in the Late Group, 28.1% of orbits and 31.8% of individuals.

The overall increase in cribra orbitalia in the Late Group is reflected in the male sub-sample, while in females, the prevalence decreases. In the Early Group, females (orbits and individuals) are affected much more often than males, while in the Late Group they are more evenly affected.

Table 4.21. Temporal Change in Cribra Orbitalia Prevalence in Ban Chiang Adults and Subadults

Group A/O %	Cribra Orbitalia in All Orbits*						
	Male		Female		Test	Total‡	
Early	**2/21**	**9.5**	**6/13**	**46.2**	**FET p=0.033**	8/37	21.6
Late	2/12	16.7	5/16	31.3	FET p=0.662	9/32	28.1
	FET p=0.610		FET p=0.466			χ^2=0.391	

Group A/O %	Cribra Oribitalia in All Individuals						
	Male		Female		Test	Total‡	
Early	**1/14**	**7.1**	**4/9**	**44.4**	**FET p=0.056**	5/25	20.0
Late	2/9	22.2	4/11	36.4	FET p=0.642	7/22	31.8
	FET p=0.538		FET p=1.000			χ^2=0.860	

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). * Right and left sides combined. ‡ Includes observations on 4 ?sex individuals. **Bold** indicates statistical significance (α=0.10).

In summary, the frequency of cribra orbitalia in adult orbits (15.2%) and individuals (18.8%), is much less than that in subadult orbits (43.5%) and individuals (40.0%). Cribra orbitalia is seen more often in females than males in both adults and subadults. Cribra orbitalia increases in Late Group male (9.5% : 16.7%) orbits and decreases in female orbits (46.2% : 31.3%); although neither difference is statistically significant. A general trend toward increasing cribra orbitalia in the Late Group is present in the combined sample (adults, subadults, unknown sex), but the increase is not statistically signficant (20.0% : 31.8% individuals).

Cranial Vault Porosis

Ban Chiang adult crania were observed with varying degrees of "pitting" or porosity of the superior frontal, parietal and occipital bones, occurring above the highest line of muscle attachment (Table B.10). There was never any perforation of the inner table of the vault. These lesions of the cranial vault are described as either fine (<0.5 mm) or coarse (>0.5 mm) [measured using a mechanical pencil lead]. As well as active, indicating perforations extending through the outer cortex and into the diploe, or "healed", suggesting the lesions are pits, i.e. the bottom has filled in, rather than perforations, but without complete restoration of the former cortical surface, resulting in a coarse, irregular ectocranial surface. These lesions are often difficult to observe because of the concretions present on the outer cranial vault.

No association was found between the presence of cribra orbitalia and porotic hyperostosis, although the available orbital roofs are small in number. The distribution of porosity and correlation with cribra orbitalia, by sex, is shown in Table 4.22. There is no statistically significant sex difference in the prevalence of cranial vault porosity.

Table 4.22. Distribution of Porotic Hyperostosis in Ban Chiang Individual Adults

Porotic Hyperostosis Affected/Observed	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
All Vaults	6/16	37.5	8/18	44.4	14/34	41.2
Vaults with Orbits						
No porosis - No cribra orbitalia	4/9	44.4	7/12	58.3	11/21	52.4
No porosis - With cribra orbitalia	2/9	22.2	1/12	8.3	3/21	14.3
Porosis And cribra orbitalia	0/9	0.0	1/12	8.3	1/21	4.8
Porosis - No cribra orbitalia	3/9	33.3	3/12	25.0	6/21	28.6

Sixteen Ban Chiang subadult crania were also assessed for the presence of porotic hyperostosis (Table B.11). Twelve of these individuals had both vaults and orbital roofs, with no vault porosis, and five affected with cribra orbitalia. None of the subadult crania was noted to be "thickened" on a qualitative basis. Two newborns, Burial BCES-48 and BCES-77, exhibit porosity of the basilar skull elements (*pars lateralis, pars basilaris*, zygoma). Burial BCES-48 also includes the long limb bone diaphyses, ribs, and phalanges, has no additional pathology noted. Burial BCES-77 exhibits additional porosity of the bilateral mandibular body, with no abnormal findings in the long limb bone diaphyses, ribs or elements of the os coxae (Figures 4.20 and 4.21).

The prevalence of porotic hyperostosis of the vault declines in Ban Chiang male crania over time, and increases in Ban Chiang female crania (Table 4.23). The total prevalence shows an increase in the Late Group at the site, however, none of the differences is statistically significant.

Table 4.23. Distribution of Porotic Hyperostosis Over Time in Ban Chiang Adults

Porotic Hyperostosis Affected/Observed	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
Early Group	4/9	44.4	1/5	20.0	5/14	35.7
Late Group	2/7	28.6	7/13	53.9	9/20	45.0
Statistic	FET=0.633		FET=0.314		χ^2=0.2932	

Note: FET=Fisher's Exact Test (two tailed probability). **Bold** indicates statistical significance (α=0.10).

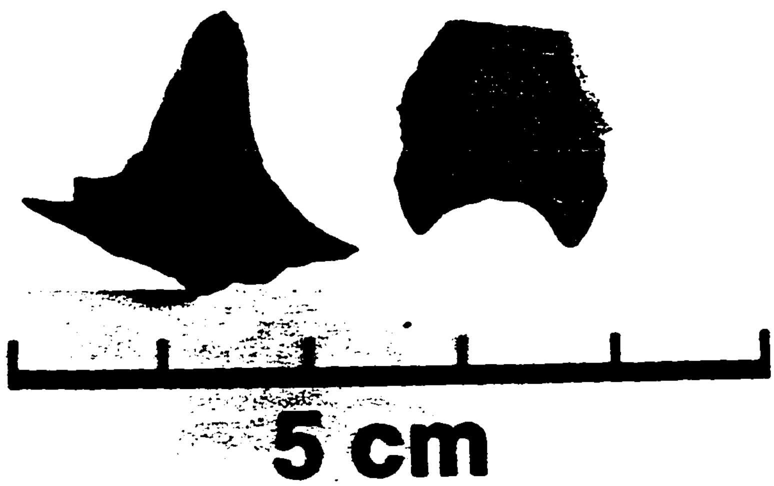


Figure 4.20. Porosity of the Zygoma and Pars Basilaris (Burial BCES-77)

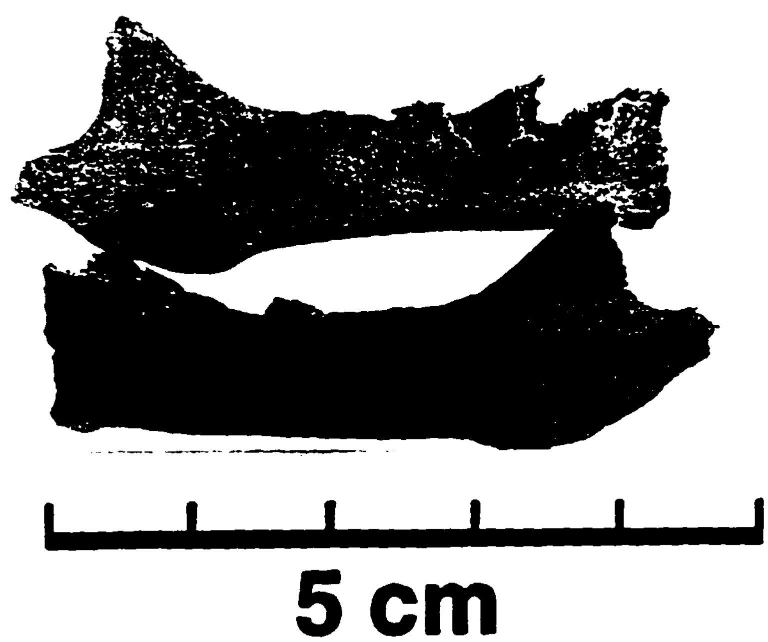


Figure 4.21. Porosity of the Mandibular Body (Burial BCES-77)

Cranial Vault Thickness

The thickness of the cranial vault bones was measured at nine anatomical points: bilateral frontal eminences, mid-frontal bone, bregma, obelion, bilateral parietal eminences, lambda and bilateral asterion. These measurements have been used by various researchers to test for an evolutionary decrease in cranial vault thickness, as well as evidence of pathologies. The drawbacks of the method include the influence of the musculature of the back and neck on the morphology and hence the thickness of the cranial vault (especially at the asterion and lambda), the effects of suture fusion on thickening bone along the suture lines (affects bregma, obelion and lambda), and problems encountered in attempting to measure a complete skull through the foramen magnum using a standard set of calipers. It is recognized that measurement of the external dimensions of the bone does not provide any evidence of what may be causing the thickening, i.e. whether it is the cortex which is thickened or the diploe; it is also recognized that the cranial vault has an ability to remodel and therefore the absence of thickening at any time during the life of the individual does not preclude cranial vault thickening at an earlier stage. There is evidence in clinical medicine for the resolution of bony changes upon resolution of the anemia, however, it is likely that resolution of an iron deficiency anemia would have been quite difficult in earlier times.

Individual measurements of the cranial vault are available in Tables B.10 and B.11, with observations of special circumstances which may contribute to excessively small or large measurements; in which case these numbers are omitted from the metrical analysis. This discussion will focus on the summary statistics (Table 4.24).

It is evident in this initial analysis, that females have generally thicker vaults than males, with the exception of the bregma, obelion, bilateral asterion (slightly smaller) and lambda. This is an unexpected result, assuming that sexual dimorphism (males being larger

Table 4.24. Mean Cranial Vault Thickness Measurements (in mm) in Ban Chiang Adults

Measurement Point	Male				Female			
	n	Mean	S.D.	Range	n	Mean	S.D.	Range
R frontal eminence	15	6.1	1.1	4 -8	12	6.7	1.3	5 -9
L frontal eminence	16	6.1	0.9	5 -8	13	6.5	1.5	4 -9
Mid-frontal	17	7.1	1.8	4 -11	13	7.1	1.4	5 -9
Bregma	17	**7.9**	2.1	4 -13	18	**6.0**	1.2	4 -9
Obelion	17	7.8	2.1	4 -13	15	6.7	1.8	4 -9
R parietal eminence	21	**5.8**	1.2	4 -9	17	**7.8**	1.5	6 -10
L parietal eminence	15	**6.1**	1.0	5 -8	15	**7.6**	1.7	4 -11
R asterion	19	6.6	1.6	4 -10	11	6.1	1.3	4 -8
L asterion	14	6.6	1.7	5 -11	10	6.0	1.8	4 -9
Lambda	19	8.2	2.1	6 -13	17	7.3	2	5 -12

Note: R=right, L=left. Representing 50 individuals: 25 males, 25 females. **Bold** cells indicate statistically significant sex differences (*Student's t* test, α=0.10).

than females) would apply to cranial vault thickness as well. While the effects of musculature on the posterior cranial vault is a ready explanation for increased thickness at the asterion and lambda in males, it will not necessarily suffice to explain greater thickening at the bregma and lambda. The female characteristics of frontal and parietal bossing might reflect a thickening of the vault in these areas. At present there is no easy explanation for this distribution of thickening. A *Student's t* test of the means of all measurements in males and females at Ban Chiang, finds statistically significant differences at the bregma (males greater), and right and left parietal eminences (females greater).

In both sexes, the minimum observed thickness at any point on the cranial vault is 4 mm. The maximum thickness in males, 13 mm, is noted at the lambda, obelion, and bregma, and the maximum thickness in females (12 mm) is also noted at the lambda. In females, the maximum thickness at the parietal eminences reaches 10 and 11 mm, compared to 8 and 9 mm in males.

The minimum thickness in adult crania is comparable to the maximum thickness in the subadult cranial vaults measured (Table 4.25). These data are presented by rough age intervals, merely to document the increase in thickness with growth. The maximum thickness in both the children (2-6 years) and subadults (6-12 years) are identical at 4 mm, occurring along the suture lines. None of these crania is noted as being "thick" as a general qualitative observation.

Table 4.25. Mean Vault Thickness Measurements (in mm) in Ban Chiang Subadults, By Age

Measurement Point	Infants (<2 years)				Children (2-6 years)				Subadults (6-15 years)			
	n	M	SD	range	n	M	SD	range	n	M	SD	range
R frontal	1	1.0	.	-	3	2.3	1.2	1-3	2	3.0	0.0	3-3
L frontal	2	1.0	0.0	1-1	6	2.0	0.6	1-3	0	.	.	-
Mid-frontal	1	3.0	.	-	5	3.0	0.0	3-3	1	5.0	.	-
Bregma	1	1.0	.	-	4	3.0	0.8	2-4	2	3.0	0.0	3-3
Obelion	3	2.3	0.6	2-3	4	2.8	1.0	2-4	2	4.0	0.0	4-4
R parietal	3	1.3	0.6	1-2	2	2.0	0.0	2-2	1	5.0		-
L parietal	1	2.0	.	-	6	2.7	0.5	2-3	2	4.0	0.0	4-4
R asterion	1	1.0	.	-	0	.	.	-	0	.	.	-
L asterion	1	2.0	.	-	4	2.5	0.6	2-3	1	4.0		-
Lambda	2	4.0	0.0	4-4	5	2.8	0.8	2-4	2	4.0	0.0	4-4

Note: R=right, L=left, n=number of measurements, M=mean, sd=standard deviation. Representing 11 individuals: 3 infants, 6 children, 2 subadults.

When examined by sex, there are no statistically significant sex differences in vault thickness measures in the subadults at Ban Chiang; however, sample sizes are small.

Table 4.26. Age Variation in Mean Vault Thickness Measurements (in mm) in Ban Chiang Adults

Age Interval (in years) Measurement Point	Male				Female			
	15-25	25-35	35-45	45-55	15-25	25-35	35-45	45-55
R frontal eminence		7.0	6.6	5.6†	7.5	7.5	7.0	7.5†
L frontal eminence		6.5	6.3	5.6†	6.0	6.0	7.0	8.0†
Mid-frontal		6.3	7.2	7.5	9.0	9.0	6.6	8.5
Bregma		7.6	7.7	7.8	6.5	6.5	6.1	6.5
Obelion		7.5	8.4	8.0	8.3	8.3	6.4	8.5
R parietal eminence		5.6	6.0*	5.9†	7.7	7.6	8.6*	8.5†
L parietal eminence		6.5	6.0*	6.3†	7.7	7.7	8.0*	9.0†
R asterion		6.3	7.5	6.6	6.0	6.0	7.0	6.0
L asterion		5.0	6.3	7.5	7.0	7.0	6.3	6.5
Lambda		9.0	7.8*	8.4	9.7	9.7	6.3*	9.0
# crania	0	4	8	8	4	5	8	3

Note: R=right, L=left. Only individuals with interval age estimates are included here: 40 individuals, 20 males, 20 females. * Statistically significant sex differences within the 35-45 year age interval (*Student's t* test, α=0.10). † Statistically significant sex differences within the 45-55 year age interval (*Student's t* test α=0.10).

Examining the variation in cranial vault thickness in a sub-sample of Ban Chiang adults (Table 4.26), does not reveal any obvious trends. The age intervals were collapsed in order to mitigate the effects of small sample size. The male sample is severely compromised by an absence of any members of the 15-25 year age interval, but there is an apparent peak in many measurements in the 35-45 years interval, with a subsequent decline in the older age interval. In the females, there is no apparent trend, although measurements at the sutures (bregma, obelion, lambda) appear quite consistent over the years. The sex differences noted in the combined sample above, are seen here in the 35-45 and 45-55 year age interval, with females exhibiting thicker vaults at the parietal eminences and males, a thicker lambda.

Temporal Changes in Mean Vault Thickness

The sex differences in cranial vault thickness at the bregma and parietal eminences are retained when the sample is divided into the two temporal periods (Table 4.27). In the Early Group, the minimum thickness in both sexes is 4 mm, while the maximum thickness is 13 in males, and 10 in females. Females have greater values in the points separate from structural thickening, i.e. frontal eminences, parietal eminences and lessor mid-frontal.

In the Late Group, the statistically significant sex differences persist at the bregma (males greater than females) and the parietal eminences (females greater than males). The maximum thickness in males is consistently on the suture line (12 mm at bregma and 13 mm at lambda), while in females, the maximum thickness is noted at the lambda (12 mm) and parietal eminences (10, 11 mm).

Examining the mean vault thicknesses by sex, over time, suggests they are rather stable (Table 4.28). In males, although there are slight increases in thickness at the mid-frontal, bregma, asterion and lambda, thickness at the obelion and parietal eminences declines. The latter is the only statistically significant difference. In the female samples, there is a statistically significant increase in the mid-frontal thickness, while thickness at the parietal eminences declines slightly. The absence of any clear, statistically significant, differences in male and female vault thickness over time is interesting.

Table 4.27. Mean Vault Thickness Measurements (in mm) in Ban Chiang Adults, By Group and Sex

Measurement Point	Early Group (EP I-IV)								Late Group (EP V- LP X)							
	Male			Female			*t* test		Male			Female			*t* test	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	6.1	0.9	5-8	6.8	1.3	5-8	12	1.156	6.2	1.5	4-8	6.7	1.5	5-9	10	0.582
L frontal	6.0	1.0	5-8	7.0	1.0	6-8	8	1.449	6.0	0.9	5-7	6.3	1.6	4-9	16	0.461
Mid-frontal	7.0	2.0	4-11	6.0	1.7	5-8	10	0.769	7.6	1.5	6-10	7.6	1.1	6-9	14	0.024
Bregma	**7.5**	2.3	4-13	**5.3**	1.0	4-6	**12**	**1.840**	**8.6**	1.8	6-12	**6.3**	1.3	5-9	**18**	**3.302**
Obelion	8.0	2.6	4-13	6.3	2.1	4-8	12	1.201	7.6	1.1	6-9	6.8	1.8	4-9	15	1.020
R parietal	**6.0**	1.1	4-8	**8.6**	1.7	6-10	**13**	**3.717**	**5.6**	1.3	4-9	**7.5**	1.3	6-10	**20**	**3.335**
L parietal	**6.5**	0.8	6-8	**8.0**	1.8	6-10	**12**	**2.162**	**5.4**	0.9	5-7	**7.5**	1.8	4-11	**14**	**2.447**
R asterion	6.4	1.1	5-9	6.0	0.0	6-6	11	0.625	6.8	2.2	4-10	6.0	1.6	4-8	14	0.789
L asterion	6.4	1.2	5-8	6.0	.	6-6		.	7.0	2.4	5-11	5.9	2.0	4-9	11	0.918
Lambda	7.9	2.1	6-12	8.3	0.5	8-9	12	0.507	8.9	2.3	6-13	7.1	2.3	5-12	17	1.641
# crania	13			7					11			17				

Note: SD=standard deviation, R=right, L=left. Representing 48 individuals: 24 males, 24 females. **Bold** cells indicate significant differences between the sexes, within the phase (*Student's t* test of the means, α=0.10).

Table 4.28. Mean Vault Thickness Measurements (in mm) in Ban Chiang Adults, By Sex and Group

Measurement Point	Male								Female							
	Early Group			Late Group			*t* test		Early Group			Late Group			*t* test	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	6.1	0.9	5-8	6.2	1.5	4-8	13	0.090	6.8	1.3	5-8	6.7	1.5	5-9	9	0.155
L frontal	6.0	1.0	5-8	6.0	0.9	5-7	13	0.000	7.0	1.0	6-8	6.3	1.6	4-9	11	0.690
Mid-frontal	7.0	2.0	4-11	7.6	1.5	6-10	14	0.628	**6.0**	1.7	5-8	**7.6**	1.1	6-9	**10**	**1.832**
Bregma	7.5	2.3	4-13	8.6	1.8	6-12	15	1.019	5.3	1.0	4-6	6.3	1.3	5-9	15	1.544
Obelion	8.0	2.6	4-13	7.6	1.1	6-9	15	0.409	6.3	2.1	4-8	6.8	1.8	4-9	12	0.507
R parietal	6.0	1.1	4-8	5.6	1.3	4-9	18	0.739	8.6	1.7	6-10	7.5	1.3	6-10	15	1.456
L parietal	**6.5**	0.8	6-8	**5.4**	0.9	5-7	**13**	**2.325**	8.0	1.8	6-10	7.5	1.8	4-11	13	0.528
R asterion	6.4	1.1	5-9	6.8	2.2	4-10	17	0.489	6.0	0.0	6-6	6.0	1.6	4-8	8	0.000
L asterion	6.4	1.2	5-8	7.0	2.4	5-11	12	0.573	6.0	.	6-6	5.9	2.0	4-9		
Lambda	7.9	2.1	6-12	8.9	2.3	6-13	16	0.913	8.3	0.5	8-9	7.1	2.3	5-12	14	0.996
# crania	13			11					7			17				

Note: SD=standard deviation, R=right, L=left. Representing 48 individuals: 24 males, 24 females. **Bold** cells indicate statistically significant differences in the sex means between the phases (*Student's t* test of the means, α=0.10).

Combining the sexes and examining the vault thicknesses for change over time, demonstrates no statistically significant differences (Table 4.29).

Table 4.29. Temporal Change in Mean Vault Thickness Measurements (in mm) in Ban Chiang Adults

Measurement Point	Early Group			Late Group			*Student's t*	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	6.4	1.1	5-8	6.4	1.4	4-9	24	0.120
L frontal	6.3	1.1	5-8	6.2	1.3	4-9	26	0.271
Mid-frontal	6.8	1.9	4-11	7.6	1.3	6-10	26	1.354
Bregma	6.9	2.2	4-13	7.1	1.8	5-12	32	0.336
Obelion	7.5	2.5	4-13	7.1	1.5	4-9	29	0.499
R parietal	6.9	1.8	4-10	6.6	1.6	4-10	35	0.409
L parietal	6.9	1.3	6-10	6.8	1.8	4-11	28	0.199
R asterion	6.3	0.9	5-9	6.4	1.9	4-10	27	0.236
L asterion	6.4	1.2	5-8	6.3	2.1	4-11	21	0.132
Lambda	8.0	1.8	6-12	7.7	2.4	5-13	32	0.357
# crania	20			28				

Note: SD=standard deviation, R=right, L=left. Representing 48 individuals: 24 males, 24 females. **Bold** indicates statistical significance (α=0.10).

While the mean cranial vault thicknesses provide some information on the range in variation in thickness, it does not help to distinguish between pathological thickness resulting from one or more of the layers of the vault, and/or robusticity. It has been shown that male skulls at Ban Chiang tend to be thicker at the suture line and posterior vault measurement points (e.g. bregma, obelion, lambda and asterion). Focusing on the remaining measurement points: the mid-frontal, and frontal and parietal eminences; as well as the "outliers", individual crania exhibiting thicknesses at more than one standard deviation from the mean, may help to distinguish the cause of increased thickness of the vault (Table 4.30).

Ten adult crania (six females, four males) have one or more thickness measurements which are more than one standard deviation from the mean thickness measurement at that point for that sex. These individuals represent 27.3% of the female sample (n=22), and 16.0% of the male sample (n=25) of crania with vault measurements. There is no apparent association of the cranial vault porosis with cranial vault thickening, nor with the presence of cribra orbitalia. Three of these individuals (30%) are from the Early Period at Ban Chiang (Burials 1-34, 2-46, and 2-51), and the others are from the Late Period (70%).

Table 4.30. Individual Burials with Maximum Vault Thickness* at Selected Points

Burial				Frontal Eminence		Mid-Frontal	Parietal Eminence		Porosis	
No.	Sex	Age	Group	Right	Left		Right	Left	Vault	Orbits
2-9	F	35-40	IX			8	**10**	9	0	
2-20	F	35-40	VII	**9**	**9**	8	**10**	**11**	0	
2-33	F	25-30	V	7	7	**9**	6	6	C A	
1-34	F	40-45	II	7		5	**10**			R-L-
2-46	F	45-50	IV	8	8		**10**	**10**	0	L-
2-59	F	45-50	V	7	8	**9**	7	8		
2-24	M	30-35	VII	**8**	7	7	6			
2-2	M	35-40	X	7	7	7	**9**		0	
2-51	M	40-45	IV	**8**	**8**	**11**	6	8	C H	L-
1-23	M	45-50	V		6	**10**	5	5	C H	R-L-

* Defined as exceeding one standard deviation above the mean (See Table 4.24), shown in bold, other measurements shown for reference. Note: F=female, M=male, 0=none, C=coarse (>0.5 mm), H=healed, R=right, L=left, -=absent, +=present.

Enlarged Nutrient Foramina

Some skeletal reactions to anemia may be very subtle and are recently being discerned and reported in the medical literature (e.g. Lawson et al. 1981, 1984). Among these changes are the formation of a "tubercle" on the posterior angle of the ribs and the presence of enlarged nutrient foramina of the hand phalanges in thalassemia.

Seven individuals in the Ban Chiang skeletal series have enlargement of the nutrient foramina of the metatarsals. None of the metacarpals, or hand or foot phalanges are noted to be affected. Nine metatarsals in two children and five adults (Burials BC-24, BC-33, BCES-5, BCES-34, BCES-52, BCES-65, and BCES-76) are affected (Table 4.31). Using any individual with one or more metatarsals, the "per individual" prevalence of enlarged nutrient foramina, is 7.7% (2/26) in adult males, 8.8% (3/24) in adult females, and 13.3% (2/15) in children.

Examining the presence of enlarged foramina by individual bone suggests the fourth metatarsal is most commonly affected (5/71, 7.0%), followed by the third (3/73, 4.1%) and the second (1/70, 1.4%). Nearly four percent of the right metatarsals are affected (6/168, 3.6%) compared with only 1.7% (3/181) of the left metatarsals. The overall prevalence of enlarged nutrient foramina of the metatarsals is 2.6% (9/349). All of the foramina are oval in shape, follow the long axis of the bone, and under magnification, the walls are smooth, there is no reactive bone surrounding the foramina, and there is no sign of cortical reaction within the opening. Radiograph of selected elements reveals no intramedullary changes and no evidence of cortical alteration.

Table 4.31. Enlarged Nutrient Foramina in the Metatarsals of Ban Chiang

Enlarged Foramina Affected/Observed		Adult		Subadult		Total	
		Male	Female	Male	Female	Male	Female
MT1	Right	0/16	0/12	0/5	0/3	0/21	0/15
	Left	0/13	0/11	0/7	0/3	0/20	0/14
MT2	Right	0/15	0/12	0/5	0/3	0/20	0/15
	Left	1/14	0/9	0/8	0/4	1/22	0/13
MT3	Right	0/14	0/11	1/5	0/2	1/19	0/13
	Left	1/20	1/11	0/7	0/3	1/27	1/14
MT4	Right	1/15	2/12	2/5	0/2	3/20	2/14
	Left	0/18	0/11	0/5	0/3	0/23	0/14
MT5	Right	0/13	0/12	0/5	0/1	0/18	0/13
	Left	0/16	0/10	0/5	0/3	0/21	0/13
MT1-5	Right	1/73	2/59	3/25	0/11	4/98	2/70
	Left	2/81	1/52	0/32	0/16	2/113	1/68
Total	A/0	3/154	3/111	3/57	0/27	6/211	3/138
	%	1.9	2.7	5.3	0.0	2.8	2.2

Note: A=affected, O=observed. Representing 64 individuals: 50 adults (26 males, 24 females), 15 subadults (9 males, 5 females). The "per individual" prevalence of enlarged nutrient foramina, is 7.7% (2/26) in adult males, 8.8% (3/24) in adult females, and 13.3% (2/15) in children.

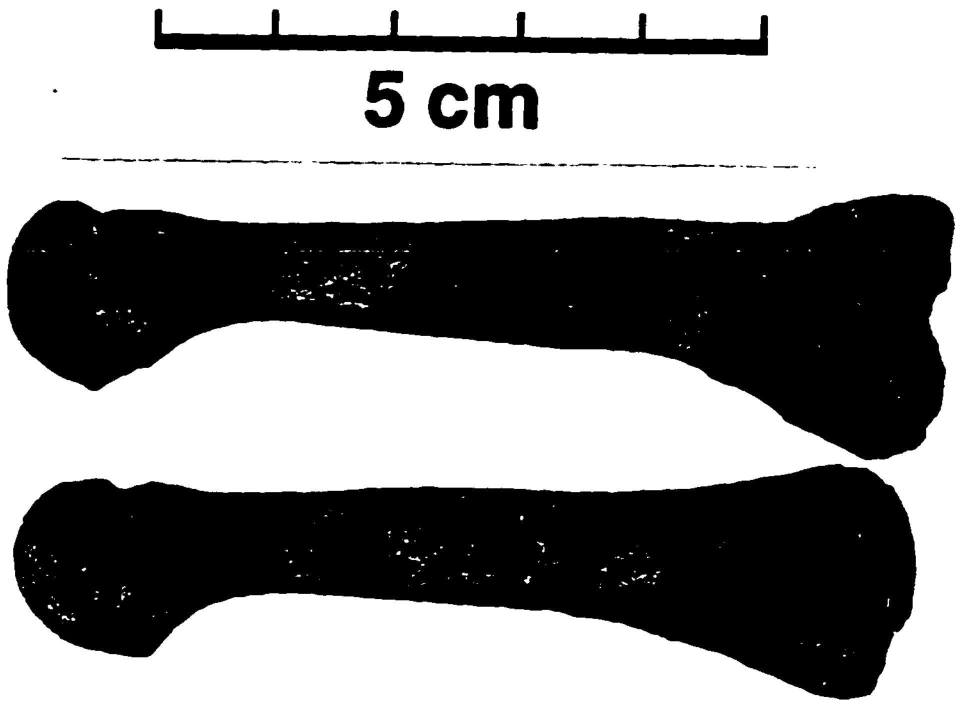


Figure 4.22. Enlarged Nutrient Foramina in Metatarsals 2 and 3

While enlarged foramina in the metatarsals are not listed in the clinical literature as a sign of anemia, the rationale behind enlarged foramina of the phalanges: i.e. an increase in the size of the nutrient artery to accommodate increased production of red blood cells; is the same. The absence of any radiologic finding of abnormality in the metatarsal also supports this conclusion. The occurrence of enlarged foramina in only selected metatarsals may be related to remodelling as a result of load distribution in the foot, with the first and fifth metatarsals responding to more stress than the interior metatarsals.

Examination of the distribution of enlarged nutrient foramina over time at Ban Chiang (Table 4.32), reveals a clustering of affected bones in the Early Phase. Six individuals (three adult females, two adult males, and one ?male child), with seven affected metatarsals, are from the Early Phase, giving a per person prevalence of 20.7% (6/29). The Late Phase prevalence, by individual, is only 2.8% (1/36). The "per bone" prevalences are less dramatically different, 4.1% compared to 1.1%, and statistical tests of this difference are not significant.

Table 4.32. Prevalence of Enlarged Nutrient Foramina of the Ban Chiang Metatarsals, By Group

Enlarged Foramina Affected/Observed	Early Group (EP I-IV)		Late Group (EP IV - LP X)	
	A/O	%	A/O	%
MT1	0/32	0.0	0/38	0.0
MT2	1/37	2.7	0/33	0.0
MT3	2/36	5.6	1/37	2.7
MT4	4/37	10.8	1/34	2.9
MT5	0/30	0.0	0/35	0.0
TOTAL	7/172	4.1	2/177	1.1

Note: A=affected, O=observed. Representing 65 individuals: 29 Early Group, 36 Late Group.

Summary of Indicators of Anemia

The most common indicator of the presence of iron deficiency anemia in skeletal remains in porotic hyperotosis of the cranial vault, including cribra orbitalia. In the Ban Chiang cranial remains, cribra orbitalia occurs in 16.4% of individuals examined. Cribra orbitalia is more common in females than males and greater in the subadults than in the adults. There is a significant increase in the presence of cribra orbitalia in the Late Group adults (5.9% : 33.3% individuals), a slight decline in subadults (50.0% : 28.6% individuals), with a general increasing trend in the combined sample (20.0% : 31.8% individuals, not statistically signficant). Cranial vault porosis is noted in 41.2% of adults and 5.9% of subadults. No association with cribra orbitalia was found, and although porosis is more common in males than females, the sex differences are not statistically significant. Overall, the frequency of porosity increases over time (35.7% ; 45.0%), but again the difference is not statistically significant.

The overall thickness of the bones of the cranial vault is greater in females than males at Ban Chiang, although the difference is not statistically significant. The minimum thickness in adults is 4 mm, and the maximum recorded was 13 mm in males, and 12 mm in females, typically at the lambda, obelion and bregma. There are no statistically significant differences in vault thickness over time in either sex or in the combined sample.

The finding of an enlarged nutrient foramen in selected metatarsals of seven individuals from Ban Chiang is interpreted as a possible indicator of anemia. The enlarged foramina are noted primarily on the right side, and involve the fourth metatarsal, followed by the third and the second. Overall, 2.6% of all metatarsals are affected, 7.7% of male metatarsals, 8.8% of female metatarsals and 13.3% of subadult metatarsals. Although the frequency declines over time (4.1% : 1.1%), the difference is not statistically signficant.

DECIDUOUS DENTAL PATHOLOGY

The sample of deciduous teeth from Ban Chiang includes eight males, nine females, and seven ?sex burials, ranging in age from less than one year to age eight (Table 4.33). For purposes of this analysis, mean ages are used, rather than age estimates. Although the sample sizes are small, the sex distribution is even, and there is a fair distribution of burials over the childhood years. The sample sizes for each individual pathology may vary slightly because of preservation.

Table 4.33. Age Distribution of the Subadult Deciduous Tooth Sample from Ban Chiang

Age (years)*	Male		Female		?Sex		Total	
	Indiv.	Teeth	Indiv.	Teeth	Indiv.	Teeth	Indiv.	Teeth
< 1	2	27	0		4	17	6	44
1	2	20	1	7	0		3	27
2	0		2	29	1	1	3	30
3	0		2	35	3	35	5	70
4	2	13	2	20	0		4	33
5	1	14	0		0		1	14
6	2	25	1	13	1	1	4	39
7	0		1	6	0		1	6
Total	9	99	9	110	9	54	27	263

* Based upon mean age estimate: *i.e.* a burial aged 5-7 is placed in the 6 year interval.
Indiv.=individual. Teeth counted as present include teeth present, erupting, and unerupted.

Summary frequencies for all dental pathologies, by tooth class and jaw, are presented in Table 4.34. No abscessing is present in 189 sockets. Detailed examination of the prevalence of caries, hypoplasia, calculus and attrition, by sex, age and group follows.

Table 4.34. Frequency of Occurrence of Deciduous Dental Pathologies (Right and Left Sides Combined)

Trait/ Variation	Maxilla								Mandible								Total	
	Molars		Canine		Incisor		Total		Molars		Canine		Incisors		Total			
Calculus	41		16		32		89		52		19		29		100		189	
none	26	63.4	11	68.8	21	65.6	58	65.2	48	92.3	16	84.2	29	100.0	93	93.0	151	79.9
slight	15	36.6	5	31.3	11	34.4	31	34.8	4	7.7	3	15.8	0	0.0	7	7.0	38	20.1
Hypoplasia	46		22		46		114		59		19		34		112		226	
absent	46	100.0	18	81.8	44	95.7	108	94.7	57	96.6	12	63.2	34	100.0	103	92.0	211	93.4
present	0	0.0	4	18.2	2	4.3	6	5.3	2	3.4	7	36.8	0	0.0	9	8.0	15	6.6
Caries	45		20		39		104		53		19		34		106		210	
absent	43	95.6	18	90.0	37	94.9	98	94.2	53	100.0	16	84.2	34	100.0	103	97.2	201	95.7
present	2	4.4	2	10.0	2	5.1	6	5.8	0	0.0	3	15.8	0	0.0	3	2.8	9	4.3
Abscessing	41		19		26		86		50		22		31		103		189	
present	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Attrition	43		20		41		104		51		20		34		105		209	
none	3	7.0	1	5.0	12	29.3	16	15.4	9	17.6	4	20.0	13	38.2	26	24.8	42	20.1
enamel	32	74.4	10	50.0	12	29.3	54	51.9	27	52.9	12	60.0	16	47.1	55	52.4	109	52.2
dentin	8	18.6	9	45.0	17	41.5	34	32.7	15	29.4	4	20.0	5	14.7	24	22.9	58	27.8

Note: Representing 27 subadults. See Table 4.33 for age distribution.

Deciduous Caries

The prevalence of caries in 24 subadults (eight males, nine females and seven ?sex) from Ban Chiang is presented in Table 4.35. Caries are noted in 9/210 deciduous teeth (4.3%). In the maxilla, there are caries in each tooth class for a total of six (5.8%), while in the mandible, caries are noted only in the canine teeth (3/19). Caries are most common in the canine teeth (5/39, 12.8%). No caries are noted in the male deciduous teeth (0/67), female caries frequency is 4.9%, and in ?sex individuals, the prevalence is 10.0%. The sex difference is statistically significant (FET p=0.079, one-tailed), but the ?sex prevalence could easily erase the difference. The nine caries are noted on the canines, incisors and molars, in two burials (BCES-26 and BCES-70, aged two and four years respectively), and all of the caries are found on the buccal/labial surface of the tooth crown.

Table 4.35. Prevalence of Caries, By Sex, in Ban Chiang Deciduous Teeth

Jaw/Tooth	Male		Female		?Sex		Total	
	A/O	%	A/O	%	A/O	%	A/O	%
Maxilla m2	0/8	0.0	2/11	18.2	0/3	0.0	2/22	9.1
m1	0/7	0.0	0/11	0.0	0/5	0.0	0/23	0.0
c	0/6	0.0	2/11	18.2	0/3	0.0	2/20	10.0
i2	0/9	0.0	0/6	0.0	2/4	50.0	2/19	10.5
i1	0/7	0.0	0/7	0.0	0/6	0.0	0/20	0.0
Total Maxillary Caries	0/37	0.0	4/46	8.7	2/21	9.5	6/104	5.8
Mandible m2	0/8	0.0	0/13	0.0	0/2	0.0	0/23	0.0
m1	0/8	0.0	0/17	0.0	0/5	0.0	0/30	0.0
c	0/4	0.0	1/11	9.1	2/4	50.0	3/19	15.8
i2	0/5	0.0	0/9	0.0	0/4	0.0	0/18	0.0
i1	0/5	0.0	0/7	0.0	0/4	0.0	0/16	0.0
Total Mandibular Caries	0/30	0.0	1/57	1.8	2/19	10.5	3/106	2.8
Total Caries	0/67	0.0	5/103	4.9	4/40	10.0	9/210	4.3

Note: A=affected, O=observed, m=molar, c=canine, i=incisor; Includes 24 individuals: eight males, nine females and seven ?sex.

The presence of carious lesions on the buccal surface of the crown, rather than on the occlusal surface, suggests a possible association with hypoplastic defects. A hypoplastic defect, by its nature, is more susceptible to carious destruction than normal enamel, both by virtue of its thinness as well as the excavated surface which can collect food debris and bacteria. Five canine teeth (in two individuals) noted to have localized hypoplasia were also scored as carious, representing 55.6% of the carious teeth in the Ban Chiang sample. In addition to these canine caries, the two incisor caries are also likely to be associated with hypoplastic defects, because of their location on the labial surface of the crown, and the presence of hypoplasias of the adjoining teeth. Thus, of the nine caries noted in the Ban Chiang deciduous teeth, seven (77.8%) may be related to hypoplastic defects.

Examining the caries prevalence by age in the Ban Chiang deciduous tooth sample (Table 4.36), shows the first caries noted at age three years in the maxillary incisors and

Table 4.36. Prevalence of Caries, By Age, in the Ban Chiang Deciduous Teeth

Jaw/Tooth Class Affected/Observed	Mean Age (in years)							
	<1	1	2	3	4	5	6	7
Maxilla molars			0/5	0/15	2/9	0/4	0/11	0/1
canine			0/2	0/6	2/5	0/2	0/4	0/1
incisors	0/6	0/3	0/3	2/10	0/8	0/2	0/7	
Total Maxilla	0/6	0/3	0/10	2/31	4/22	0/8	0/22	0/2
Mandible molars		0/2	0/6	0/14	0/10	0/4	0/13	0/4
canines		0/1	0/4	2/8	1/1	0/1	0/4	
incisors	0/5	0/5	0/8	0/15		0/1		
Total Mandible	0/5	0/8	0/18	2/37	1/11	0/6	0/17	0/4
Total Carious Teeth	0/11	0/11	0/28	4/68	5/33	0/14	0/39	0/6
No. of Individuals	0/4	0/2	0/3	1/5	1/4	0/4	0/4	0/1

Note: Representing 24 individuals: eight males, nine females, seven ?sex.

mandibular canines. Caries of the molar teeth, which are not related to hypoplastic defects are not observed until age four years.

Examination of the prevalence of caries in the Ban Chiang deciduous tooth sample by phase (Table 4.37) shows an even distribution: one individual is affected in each phase. Although there is a slight increase in the prevalence of caries in the Late Group (3.5% : 5.3%), it is not statistically significant. The mean number of affected teeth per affected person is 1.67 (SD=0.44) in the Early Group and 2 (SD=1) in the Late Group.

Table 4.37. Summary of Caries, By Group, in Ban Chiang Deciduous Teeth

Jaw/Tooth Class Affected/Observed	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
Maxilla molars	0/27	0.0	2/18	11.1	FET	0.155
canines	0/11	0.0	2/9	22.2	FET	0.189
incisors	2/18	11.1	0/21	0.0	FET	0.206
Total Maxillary	2/56	3.6	4/48	8.3	FET	0.411
Mandible molars	0/32	0.0	0/21	0.0		
canines	2/12	16.7	1/7	14.3	FET	1.000
incisors	0/15	0.0	0/19	0.0		
Total Mandible	2/59	3.4	1/47	2.1	FET	1.000
Total Carious Teeth	4/115	3.5	5/95	5.3	FET	0.734

Note: Early Group includes EPI-EPIV, Late Group includes EPV-LPX. A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 24 individuals: 10 Early Group, 14 Late Group.

Deciduous Dental Hypoplasia

The prevalence of dental enamel hypoplasias is 6.6% (15/226) in the Ban Chiang deciduous tooth sample (Table 4.38). In the maxillary teeth, hypoplasias are recorded in the canines (18.2%, 4/22) and the first incisors (8.7%, 2/23); while in the mandible, the canines

(36.8%, 7/19), and first (3.1%, 1/27) and second molars (3.7%, 1/27) are affected. Overall, hypoplasias are slightly more common in the mandibular teeth (8.0%) than the maxillary teeth (5.3%). Hypoplasias are significantly more common in female teeth (10.4%) than male teeth (2.9%), a difference which is directly attributable to the greater prevalence of hypoplasias in female canine teeth.

Table 4.38. Prevalence of Dental Enamel Hypoplasia, By Sex, in Ban Chiang Deciduous Teeth

Jaw/Tooth	Male		Female		?Sex		Total	
	A/O	%	A/O	%	A/O	%	A/O	%
Maxilla m2	0/8	0.0	0/11	0.0	0/3	0.0	0/22	0.0
m1	0/7	0.0	0/11	0.0	0/6	0.0	0/24	0.0
c	0/6	0.0	4/11	36.4	0/5	0.0	4/22	18.2
i2	0/9	0.0	0/7	0.0	0/7	0.0	0/23	0.0
i1	1/7	14.3	1/8	12.5	0/8	0.0	2/23	8.7
Total Maxilla	1/37	2.7	5/48	10.4	0/29	0.0	6/114	5.3
Mandible m2	0/9	0.0	1/15	6.7	0/3	0.0	1/27	3.7
m1	0/9	0.0	1/17	5.9	0/6	0.0	1/32	3.1
c	1/4	25.0	4/11	36.4	2/4	50.0	7/19	36.8
i2	0/5	0.0	0/8	0.0	0/5	0.0	0/18	0.0
i1	0/5	0.0	0/7	0.0	0/4	0.0	0/16	0.0
Total Mandible	1/32	3.1	6/58	10.3	2/22	9.1	9/112	8.0
Total Hypoplasia	**2/69**	**2.9***	**11/106**	**10.4***	2/51	3.9	15/226	6.6

Note: A=affected, O=observed, m=molar, c=canine, i=incisor; Includes 27 individuals. *Chi Square test is significant at α=0.10 (χ^2=3.399, df=1, p=0.065).

Hypoplasias in the deciduous teeth were scored following the scale used in the permanent teeth (linear enamel hypoplasia [LEH], linear groove, linear horizontal pits, non-linear pits, and single pits). An additional category was added to accommodate the special instance of "localized hypoplasia of the primary canine" (LHPC) proposed by Skinner (1986) and Skinner and Hung (1989). LHPC is defined as a roughly circular hypoplastic defect occurring on the mesial labial surface of the deciduous canine. The defect is the result of a combination of localized minor trauma to the bone overlying the unerupted tooth, and the nutritional status of the infant/mother (i.e. availability of calcium) which affects the thickness of the alveolar bone (Skinner and Hung 1989, Lukacs 1991). Skinner found that the defect forms at around six months, and is twice as common in the mandible as in the maxilla.

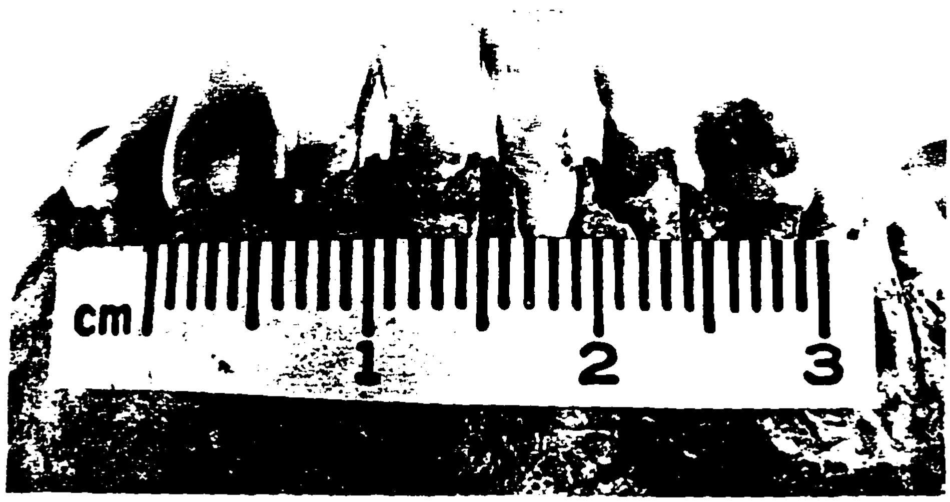


Figure 4.23. Localized Hypoplasia of the Primary Canine (LHPC)

In the Ban Chiang deciduous dental sample (Table 4.39), the primary type of hypoplasia is LHPC (66.7%) [Figure 4.23]. Only two of the 11 affected canine teeth (one maxillary and one mandibular) were noted to have LEH (18.2%), and the other non-LHPC defects were noted in molars and incisors. The LHPC noted in an incisor tooth may seem an enigma, but Skinner (1986) also reported on the occasional incisor. When the LHPC defects are subtracted from the total, the prevalence of dental enamel hypoplasia in Ban Chiang deciduous teeth is negligible (2.2%, 5/226). The prevalence of LHPC in canine teeth at Ban

Chiang, 22.0% (9/41), is larger than that reported by Lukacs (14.6%), but is comparable to prevalences reported by Skinner (28.9% Calcutta children).

Table 4.39. Distribution of Ban Chiang Deciduous Hypoplastic Teeth by Type, Sex and Tooth Class

Tooth Class Hypoplasia Type		Male		Female		?Sex		Total	
		n/A	%	n/A	%	n/A	%	n/A	%
Molars	LEH			2/2	100.0			2/2	100.0
Canines	LEH			2/8	25.0			2/11	18.2
	LHPC	1/1	100.0	6/8	75.0	2/2	100.0	9/11	81.8
Incisors	LEH			1/1	100.0			1/2	50.0
	LHPC	1/1	100.0					1/2	50.0
Total	LEH			5/11	45.5			5/15	33.3
	LHPC	2/2	100.0	6/11	54.5	2/2	100.0	10/15	66.7

Note: n=number, A=affected, LEH=linear enamel hypoplasia, LHPC=Localized hypoplasia of the primary canine.

The Ban Chiang deciduous canine teeth (n=41; 22 maxillary, 19 mandibular) represent 16 individuals. Five individuals (three females, one male and one ?sex) are affected with LHPC (5/16, 31.3%). The mean number of affected teeth per affected individual (MATAP) is 1.8 (9/5), which is slightly larger than that found by Lukacs (1.6) [1991:518]. The MATAP in males (1, 1/1) is half that in females (2, 6/3).

The distribution of dental enamel hypoplasias by age (Table 4.40) shows the defects in the mandibular canines are found in individuals aged two to four years, and those in the maxilla in individuals aged four years, and in both jaws at age six. The LEH defects of the molars are seen at age three in the mandible. The clustering of these teeth at these age intervals is likely to be the result of an inability to assess the canine teeth prior to their eruption (1.5-2.5 years).

Table 4.40. Prevalence of Hypoplasia, By Age, in the Ban Chiang Deciduous Teeth

Jaw/Tooth Class Affected/Observed	Mean Age (in years)							
	<1	1	2	3	4	5	6	7
Maxilla molars	0/1		0/5	0/15	0/9	0/4	0/11	0/1
canine	0/2		0/2	0/6	3/5	0/2	0/4	1/1
incisors	0/11	0/3	0/3	0/12	1/7	0/2	1/7	
Total Maxilla	0/14	0/3	0/10	0/33	4/22	0/8	1/22	1/2
Mandible molars	0/2	0/4	0/8	2/14	0/10	0/4	0/13	0/4
canines		0/1	2/4	3/8	1/1	0/1	1/4	
incisors	0/6	0/5	0/8	0/14		0/1		
Total Mandible	0/8	0/10	2/20	5/36	1/11	0/6	1/17	0/4
Total Hypoplasias	0/22	0/13	2/30	5/69	5/33	0/14	2/39	1/6
No. of Individuals	0/6	0/3	1/3	2/5	2/4	0/1	1/4	1/1

Note: Representing 24 individuals: eight males, nine females, seven ?sex.

There is a significant difference in the prevalence of maxillary LHPC in the Early (0.0%) and Late Group (33.3%) at Ban Chiang (Table 4.41), and although the differences in the mandibular prevalence of LHPC are not statistically significant, there is evidence of a shift in location from the mandible to the maxilla. The mean number of affected teeth per affected person (MATAP) in canine teeth is 1.6 (SD=0.47) in the Early Group, and 2 (SD=1) in the Late Group, supporting a slight trend toward higher prevalence. There are no differences in the prevalence of LEH between the temporal groupings at Ban Chiang.

Table 4.41. Summary of Hypoplasias, By Group, in Ban Chiang Deciduous Teeth

Hypoplasia/Tooth Class Affected/Observed	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
LHPC						
maxillary canines	**0/13**	**0.0**	**3/9**	**33.3**	**FET**	**0.055**
mandibular canines	5/12	41.7	1/7	14.3	FET	0.333
All canines	5/25	20.0	4/16	25.0	FET	0.717
LEH						
molars	2/139	1.4	1/95	1.1	FET	1.000
canines	2/54	3.7	1/33	3.0	FET	1.000
incisors	0/75	0.0	1/42	2.4	FET	0.359
All teeth	4/268	1.5	3/170	1.8	FET	1.000

Note: Early Group includes EPI-EPIV, Late Group includes EPV-LPX. A=affected, O=observed, FET=Fisher's Exact Test (one-tailed probability). Includes 24 individuals: 13 Early Group, 14 Late Group. **Bold** indicates statistical significance (α=0.10).

Deciduous Dental Attrition

Twenty-four subadults have teeth scored for attrition (Table 4.42), ranging in scale from none to dentin exposure. There is more advanced wear (dentin exposure) in the maxillary teeth (34/104, 32.7%) than in the mandibular teeth (24/105, 22.9%). In the maxilla, the anterior teeth are most often worn to the dentin, while in the mandible, the first molar (32.1%) has the most wear. Although female teeth have more advanced wear in the maxilla (43.5%) than male teeth (37.8%), the difference is not statistically significant (χ^2=0.270, df=1, p=0.603). In the mandible, male teeth (36.7%) are worn to the dentin more than female teeth (23.2%), again, not statistically significant (χ^2=1.757, df=1, p=0.185). Overall, 20.1% of the teeth (42/209) have no wear, 52.2% (109/209) have enamel wear and 27.8% (58/209) have wear to the dentin.

Table 4.42. Dental Attrition in the Ban Chiang Deciduous Teeth

Tooth Degree	Maxilla								Mandible							
	Male		Female		?Sex		Total		Male		Female		?Sex		Total	
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
m2 None	0/8	0.0	2/9	22.2	0/3	0.0	2/20	10.0	0/8	0.0	3/13	23.1	0/2	0.0	3/23	13.0
Enamel	6/8	75.0	7/9	77.8	3/3	100.0	16/20	80.0	4/8	50.0	8/13	61.5	2/2	100.0	14/23	60.9
Dentin	2/8	25.0	0/9	0.0	0/3	0.0	2/20	10.0	4/8	50.0	2/13	15.4	0/2	0.0	6/23	26.1
m1 None	0/7	0.0	0/11	0.0	1/5	20.0	1/23	4.3	0/8	0.0	4/15	26.7	2/5	40.0	6/28	21.4
Enamel	5/7	71.4	7/11	63.6	4/5	80.0	1623	69.6	4/8	50.0	6/15	40.0	3/5	60.0	13/28	46.4
Dentin	2/7	28.6	4/11	36.4	0/5	0.0	6/23	26.1	4/8	50.0	5/15	33.3	0/5	0.0	9/28	32.1
c None	0/6	0.0	0/11	0.0	1/3	33.3	1/20	5.0	0/4	0.0	2/12	16.7	2/4	50.0	4/20	20.0
Enamel	2/6	33.3	6/11	54.5	2/3	66.7	10/20	50.0	2/4	50.0	8/12	66.7	2/4	50.0	12/20	60.0
Dentin	4/6	66.7	5/11	45.5	0/3	0.0	9/20	45.0	2/4	50.0	2/12	16.7	0/4	0.0	4/20	20.0
i2 None	4/9	44.4	0/7	0.0	2/4	50.0	6/20	30.0	4/5	80.0	0/9	0.0	2/4	50.0	6/18	33.3
Enamel	3/9	33.3	3/7	42.9	2/4	50.0	8/20	40.0	0/5	0.0	6/9	66.7	2/4	50.0	8/18	44.4
Dentin	2/9	22.2	4/7	57.1	0/4	0.0	6/20	30.0	1/5	20.0	3/9	33.3	0/4	0.0	4/18	22.2
i1 None	2/7	28.6	0/8	0.0	4/6	66.7	6/21	28.6	5/5	100.0	0/7	0.0	2/4	50.0	7/16	43.8
Enamel	1/7	14.3	1/8	12.5	2/6	33.3	4/21	19.0	0/5	0.0	6/7	85.7	2/4	50.0	8/16	50.0
Dentin	4/7	57.1	7/8	87.5	0/6	0.0	11/21	52.4	0/5	0.0	1/7	14.3	0/4	0.0	1/16	6.3
All None	6/37	16.2	2/46	4.3	8/21	38.1	16/104	15.4	9/30	30.0	9/56	16.1	8/19	42.1	26/105	24.8
Enamel	17/37	45.9	24/46	52.2	13/21	61.9	54/104	51.9	10/30	33.3	34/56	60.7	11/19	57.9	55/105	52.4
Dentin	14/37	37.8	20/46	43.5	0/21	0.0	34/104	32.7	11/30	36.7	13/56	23.2	0/19	0.0	24/105	22.9

Note: 24 individual burials represented: 8 males, 9 females, 7 ?sex.

Since dental attrition is age-related, examination of the distribution of wear with age is essential (Table 4.43). The first dentin exposure is noted in female teeth at age two years (incisors), male teeth are lacking in these early ages, but modeling on the female data, as expected, dentin exposure gradually increases in ensuing years. Dentin exposure in the canines and first molars occurs by age four years, and dentin exposure in the second molars by age six years. The sex differences noted above in the separate jaws are not evident in this combined sample, where dentin exposure occurs in 37.3% of male teeth and in 32.4% of female teeth. No conclusions on sex differences in the timing of wear can be formulated because of small sample sizes.

Table 4.43: Summary of Dental Attrition By Age and Sex in Ban Chiang Deciduous Teeth

Sex % Teeth Affected		Mean Age (in years)								Total	
		<1	1	2	3	4	5	6	7	A/O	%
Male	Teeth observed	8	7	0	0	13	14	25	0	67	
	None	100.0	100.0							15	22.4
	Enamel					84.6	64.3	28.0		27	40.3
	Dentin					15.4‡	35.7	72.0*		25	37.3
Female	Teeth observed		3	25	35	20	0	13	6	102	
	None			32.0	8.6					11	10.8
	Enamel		100.0	60.0	74.3	50.0		15.4	33.3	58	56.9
	Dentin			8.0†	17.1†	50.0‡		84.6	66.7	33	32.4
?Sex	Teeth observed	3	0	1	35	0	0	1	0	40	
	None	100.0			37.1					16	40.0
	Enamel			100.0	62.9			100.0		24	60.0

Note: A=affected, O=observed. Representing 24 individuals: 8 males, 9 females, 7 ?sex. † incisor teeth, ‡ includes incisor, canine and first molar teeth, * includes incisors, canines, first and second molar teeth.

Examining change over time in the prevalence of attrition (Table 4.44) in the deciduous tooth sample from Ban Chiang, it is apparent that dentin exposure occurs at an earlier age in the Early Group (age two years) than in the Late Group (age four years). The observations of advanced wear at age two and three years represent dentin exposure in the incisor teeth of both jaws, suggesting that there is less use of the anterior teeth in the Late Group.

Table 4.44. Prevalence of Dental Attrition, By Age and Group, in the Ban Chiang Deciduous Teeth

Group/Degree of Attrition % Teeth Affected	Mean Age (in years)							
	<1	1	2	3	4	5	6	7
Early Group # Teeth	1	0	10	55	13	0	38	0
None	100.0		60.0	5.4				
Enamel			20.0	83.6	84.6		23.7	
Dentin			20.0†	10.9†	15.4		76.3	
Late Group # Teeth	10	10	16	15	20	14	1	6
None	100.0	70.0	12.5	86.7				
Enamel		30.0	87.5	13.3	50.0	64.3	100.0	33.3
Dentin					50.0	35.7		66.7

Note: Representing 24 individuals: 8 male, 9 female, 7 ?sex; 10 Early Group, 14 Late Group.
† represents dentin exposure in the incisor teeth.

The overall prevalence of advanced attrition, by phase, in the Ban Chiang deciduous tooth sample, supports the presence of more advanced wear in the Early Group (33.3%, 39/117) compared to the Late Group (20.7%, 19/92), a difference which is statistically significant (χ^2=4.131, df=1, p=0.042). While the age distribution of these two sub-samples is fairly equal, and all tooth classes are present in each sample, the Early Group has many more teeth available, raising the possibility that the lack of advanced wear in the Late Group sample may be due to sampling error.

Deciduous Dental Calculus

Only slight degrees of dental calculus are observed in 20.1% (38/151) of the deciduous teeth from Ban Chiang (Table 4.45). Overall, slight calculus is more common in the maxillary teeth (34.8%, 31/89) than in the mandibular teeth (7.0%, 7/100). Calculus prevalence is significantly greater in male teeth than in female teeth in the maxilla (60.6% : 20.9%), mandible (28.0% : 0.0%), and overall (46.6% : 9.0%). Calculus is of course related to age, the length of time the tooth is erupted, and retained in the dentition, as well as location. Typically anterior teeth are more self-cleaning than posterior teeth and should have less calculus.

Table 4.45. Prevalence of Slight Dental Calculus, By Sex, in Ban Chiang Deciduous Teeth

Jaw/Tooth Class Slight calculus	Male		Female		Statistic		?Sex	
	A/O	%	A/0	%	Test	*p*	A/O	%
Maxilla molars	9/15	60.0	4/20	20.0			2/6	33.3
canines	4/6	66.7	1/9	11.1			0/1	0.0
incisors	7/12	58.3	4/14	28.6			0/6	0.0
Total Maxilla	**20/33**	**60.6**	**9/43**	**20.9**	**χ^2=12.455**	**0.000**	2/13	15.4
Mandible molars	4/16	25.0	0/30	0.0			0/6	0.0
canines	3/4	75.0	0/11	0.0			0/4	0.0
incisors	0/5	0.0	0/16	0.0			0/8	0.0
Total Mandible	**7/25**	**28.0**	**0/57**	**0.0**	**FET**	**0.0001**	0/18	0.0
All Teeth	**27/58**	**46.6**	**9/100**	**9.0**	**χ^2=29.423**	**0.000**	2/31	6.5

Note: A=affected, O=Observed, FET=Fisher's Exact Test (two-tailed probabilities). Includes 21 individuals: 6 males, 9 females and 6 ?sex.

Table 4.46. Summary of Slight Dental Calculus By Age, Jaw and Sex in Ban Chiang Deciduous Teeth

Sex/ Jaw Slight Calculus		Age Interval in Years								Total	
		<1	1	2	3	4	5	6	7	A/O	%
Male	A/O		0/7			9/13	0/14	18/24		27/58	46.6
	%					69.2	0.0	75.0			
Female	A/O		0/4		0/26	0/35	9/16	0/13	0/6	9/100	9.0
	%		0.0		0.0	0.0	56.3	0.0	0.0		
?Sex	A/O	0/3		0/1	2/27*					2/31	6.5
	%	0.0		0.0	7.4						
Maxilla	A/O	0/3	0/3	0/9	2/25*	18/18	0/8	11/21	0/2	31/89	34.8
	%				8.0	100.0		52.4			
Mandible	A/O		0/8	0/18	0/37	0/11	0/6	7/16	0/4	7/100	7.0
	%							43.8			
Total	A/O	0/3	0/11	0/27	2/62*	18/29	0/14	18/37	0/6	38/189	20.1
	%				3.2	62.1		48.6			

Note: A=affected, O=observed. Representing 21 subadults: 6 males, 9 females, 6?sex. *molar teeth.

Table 4.46 documents the first occurrence of calculus in the maxillary molars by age three. In individuals of known sex, slight calculus is noted in females by five years, and in males at four years, although there are no male teeth in earlier age intervals. Calculus is not noted in the mandible until age six years, approximately three years later than in the maxilla. The presence of adequate numbers of female teeth in the later ages (years four - seven) which do not have calculus suggests that the greater prevalence of calculus in male teeth is not related to older age-at-death. But again, the application of the ?sex tooth sample with calculus could serve to balance the prevalences.

Examining the prevalence of calculus over time may suggest changes in childhood diet. The prevalence of slight calculus, by age and phase (Table 4.47), suggests that the Early Group sample has more older teeth, and more calculus (26.9%, 29/108) than the Late Group (9/81, 11.1%); a difference that is statistically significant (χ^2=7.139, df=1, p=0.008). Examining the age classes where slight calculus is predominant, ages three through six, 29.9% (29/97) of the Early Group teeth are affected, and 20.0% (9/45) of the Late Group teeth, a difference which is not significant at α=0.05. This suggests that the differences in slight calculus are related to the varying age distributions in each group. The erratic distribution and small samples sizes make any conclusions tentative.

Table 4.47. Slight Calculus, By Age and Group, in the Ban Chiang Deciduous Teeth

Group	Mean Age (in years)							
	<1	1	2	3	4	5	6	7
Early Group A/O	0/1	0/10	2/47	9/13			18/37	
%			4.3	69.2			48.6	
Late Group A/O	0/2	0/11	0/17	0/15	9/16	0/14		0/6
%					56.3			

Note: Representing 21 individuals: 10 Early Group, 11 Late Group.

Summary of Deciduous Oral Health

Twenty-seven subadults contribute 226 observations of dental pathology in the Ban Chiang deciduous tooth sample. The prevalence of caries is low (4.3%, 9/210), and demonstrates a significant sex difference (male 0.0% : female 4.9%), but with 10.0% of the ?sex tooth sample affected. The nine caries are noted in two individuals [mean number of affected teeth per affected person [MATAP=4.5, SD=0.5], and most are observed on the buccal/labial surface of the tooth crown, suggesting association with hypoplastic defects. Caries are first noted at age three. The majority of the 6.6% (15/226) hypoplastic teeth in the Ban Chiang sample are localized hypoplasia of the primary canine [LHPC 10/15, 66.7%]. LHPC are more common in the mandibular canines (36.8%) than the maxillary canines (8.2%) and are more common in female canines (8/22, 36.4%) than male canines (1/10, 10.0%). The MATAP of LHPC is 1.8.

Dental attrition exposes the dentin in 22.9% of the deciduous tooth sample at Ban Chiang. The anterior teeth are affected at the youngest age. There are no obvious sex differences in the prevalence of advanced (dentin) attrition. Only slight calculus is observed in the deciduous teeth (20.1%, 38/151), more often in the male teeth than female teeth (46.6% : 9.0%), independent of the age distribution of the samples. Calculus is first noted in the molars at age three years.

The prevalence of these four dental pathologies over time, Table 4.48, shows mixed results. There is a slight increase in the prevalence of caries (3.5% : 5.3%) and LHPC (20.0% : 25.0%) in the Late Group, but neither increase is statistically significant. Significant decreases are noted in the prevalence of advanced attrition and slight calculus (the latter difference is attributable to differences in the age distribution of the samples, and the former subject to small sample error). There is evidence of a shift in the location of LHPC from the mandible in the Early Group to the maxilla in the Late Group, a change which may be linked to varying weaning behaviors.

Table 4.48. Summary of Dental Pathology, By Group, in Ban Chiang Deciduous Teeth

Pathology	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
Caries Teeth	4/115	3.5	5/95	5.3	FET	0.734
MATAP	1.67	SD=0.44	2	SD=1		
LHPC Canines	5/25	20.0	4/16	25.0	FET	0.717
MATAP	1.6	SD=0.47	2	SD=1		
Attrition (advanced)	**39/117**	**33.3**	**19/92**	**20.7**	**χ^2=4.131**	**0.042**
Calculus (slight degree)	**29/108**	**26.9**	**9/81**	**11.1**	**χ^2=7.139**	**0.008**

Note: Early Group includes EP I-IV; Late Group includes EP V- LP X. A=affected, O=observed, SD=standard deviation, LHPC=localized hypoplasia of the primary canine, MATAP=mean number of affected teeth per affected individual. **Bold** indicates statistical significance (α=0.10).

ADULT DENTAL PATHOLOGY

This section reviews the evidence of oral health in the Ban Chiang permanent dentitions. The permanent teeth are discussed here, and data are divided into subadults (< 15 years of age) and adults (>15 years of age). Since many of the dental paleopathologies (e.g. premortem tooth loss and alveolar resorption) typically do not affect individuals less than 15 years or even 20 years, the overall frequencies only are presented for subadults and the data are excluded in further analysis of sex and temporal differences.

Premortem Tooth Loss

Loss of individual teeth due to progressive dental disease rather than accident is the subject of this section. In general, accidental tooth loss is quite rare and typically affects the anterior maxillary dentition in young adults. Deliberate tooth removal, or ablation, for cultural purposes is recognized by a recurring pattern of tooth loss in the presence of good dental health overall. Removal of the maxillary lateral incisors and canines was the pattern described in five individuals (2 males and 3 ?sex) from Ban Kao (Sangvichien et al. 1969:33). Mention was made that missing crowns might also be the result of aborted attempts at extraction, a point also made by Pietrusewsky (1974a). However, the fragmentary and brittle nature of these skeletal remains makes the designation of partial teeth as evidence of evulsion difficult. More recently, tooth ablation has also been identified in more than two-thirds of the adults in the Khok Phanom Di skeletal series (Tayles 1996). Thirteen different patterns, all involving loss of the incisors of both jaws, are identified, the most common being removal of the lateral maxillary incisors. No sex differences in pattern could be discerned. In the present analysis, teeth which were noted as possible deliberate ablation will be identified, but will be included as examples of premortem tooth loss, since no clear pattern was established.

Table 4.49. Premortem Tooth Loss in Ban Chiang Subadult (<15 Years) Permanent Teeth

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/9	0/4	0/2	0/6	0/21	0/10	0/4	0/2	0/11	0/27	0/48
Female	0/3				0/3	0/3			0/3	0/6	0/9
? Sex	0/2	0/2		0/3	0/8	0/6	0/6	0/2	0/7	0/21	0/29
Total	0/15	0/6	0/2	0/9	0/32	0/19	0/10	0/4	0/21	0/54	0/86

Note: M=molar, P=premolar, C=canine, I=incisor. Eleven individual burials (4 males, 5 females, 2 ?sex) are represented.

There is no premortem loss of permanent teeth in individuals less than 15 years of age (Table 4.49). In the adult permanent teeth from Ban Chiang (Table B.12), premortem tooth loss is uncommon (6.7%, 92/1365). Tooth loss occurs more often in the mandibular teeth (8.7%) than the maxillary teeth (4.5%). As would be expected, tooth loss is greatest in the molars and premolars (8.7%, 76/869) compared to the anterior teeth (3.2%, 16/496). Four incisors (two female maxillary incisors and two male mandibular incisors) are noted as possibly lost due to ablation or evulsion, which then lowers the prevalence of loss of the anterior teeth to 2.4% (12/496).

Overall, premortem loss is slightly more common in male teeth (7.4%) than female teeth (6.2%), a difference which is not statistically significant (Table 4.50). The only significant sex difference is found in the greater prevalence of premortem loss of the mandibular incisors in males (8.7%). These eight teeth, lost in three individual males, are suggestive of deliberate removal, but in two of the three burials other teeth had also been lost.

Table 4.50. Prevalence of Premortem Tooth Loss, By Sex, in Adult (>15 years) Permanent Teeth

Jaw/Tooth Class	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	10/120	8.3	7/102	6.9	χ^2=0.169	0.681
Premolars	5/86	5.8	1/84	1.2	FET	0.211
Canine	1/42	2.4	0/40	0.0	FET	1.000
Incisors	1/74	1.4	3/69	4.3	FET	0.353
Total Maxillary Tooth Loss	17/322	5.3	11/295	3.7	χ^2=0.855	0.355
Mandible Molars	24/144	16.7	21/124	16.9	χ^2=0.003	0.953
Premolars	4/103	3.9	4/91	4.4	FET	1.000
Canine	0/52	0.0	2/43	4.7	FET	0.202
Incisors	**8/92**	**8.7**	**1/74**	**1.4**	**FET**	**0.044**
Total Mandibular Tooth Loss	36/391	9.2	28/332	8.4	χ^2=0.133	0.715
Total Tooth Loss	53/713	7.4	39/627	6.2	χ^2=0.768	0.381

Note: A=affected, O=observed, FET=Fisher's Exact Test, 2-tailed probabilities. Includes 64 individuals: 31 males, 33 females; 60 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Theoretically, tooth loss should increase with age, since the factors resulting in loss (e.g. caries, attrition, etc.) are typically age-related; however, as teeth are lost, the prevalence of loss will decline. This is the pattern evident in the sub-sample of Ban Chiang teeth with specified age intervals (Table 4.51). The first teeth to be lost are third molars, at 25-30 years. The absence of any tooth loss in the 30-35 interval is likely the result of small sample size. Premortem tooth loss is rare before the age of 35 years (3/356, 0.08%), gradually increasing in subsequent years. The anterior teeth are lost in the later age intervals. There are no obvious sex differences in the timing of tooth loss, both sexes demonstrating a consistent frequency in the later age intervals, although the male sample is very deficient in the later years. Premortem tooth loss is greater in the mandible than the maxilla, and that difference may be seen in overall larger numbers of teeth lost from the mandible at each age interval.

Table 4.51. Summary of Premortem Tooth Loss, By Age and Sex, in Ban Chiang Permanent Teeth (Individuals >15 years of age)

Sex / Jaw		Age Interval in Years									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Male	individuals	1	0	3	1	6	4	7	1	0	23
	A/O	0/2		1/85*	0/23	3/141	4/78	25/200	2/21		35/550
	%	0.0		1.2	0.0	2.1	5.1	12.5	9.5		6.4
Female	individuals	5	1	2	1	6	3	4	0	2	24
	A/0	0/97	0/28	2/64*	0/32	2/109	5/50	12/94		5/26	26/500
	%	0.0	0.0	3.1	0.0	1.8	10.0	12.8		19.2	5.2
Maxilla	A/O	0/64	0/14	1/80*	0/23	1/127	3/50	12/137	0/8	0/9	17/512
	%	0.0	0.0	1.3	0.0	0.8	6.0	8.8	0.0	0.0	3.3
Mandible	A/O	0/60	0/14	2/69*	0/32	4/123	6/78	25/157	2/13	5/17	44/563
	%	0.0	0.0	2.9	0.0	3.3	7.7	15.9	15.4	29.4	7.8
Total	individuals	7	1	5	2	12	7	11	1	2	48
	A/O	0/124	0/28	3/149*	0/55	5/250	9/128	37/294	2/21	5/26	61/1075
	%	0.0	0.0	2.0	0.0	2.0	7.0	12.6	9.5	19.2	5.7

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 23 males, 24 females and 1 ?sex individual. * These teeth are third molars.

Premortem Tooth Loss By Group

The frequency of premortem tooth loss is slightly greater in males (7.4%) than in females (6.2%), but only the prevalence in the mandibular incisors was significantly different. The prevalence of tooth loss at Ban Chiang, by sex and group, is summarized in Table 4.52. In the Early Group, the prevalence in male teeth (6.7%) is slightly less than that in female teeth (7.1%). The only significant sex difference in the Early Group is in the greater loss of the maxillary teeth in females (7.3%) compared to males (3.1%). The molar teeth of both jaws are most commonly lost premortem, while the high rate of loss of the mandibular incisors in males (10.4%) creates a suspicion of ablation. In the Late Group at Ban Chiang, premortem tooth loss is significantly higher in male teeth (8.4%) than female teeth (5.6%). There are significant differences in the maxillary molars, summed maxillary teeth, mandibular incisors and all teeth (bold cells).

Comparing the prevalence of premortem tooth loss in males over time, there is an increase in tooth loss in the Late Group (6.7% : 8.4%). The increase is statistically significant in the maxillary teeth (χ^2=4.796, p=0.029), while in the mandible, premortem loss declines (10.3% : 8.2%), leaving no statistical difference in the combined jaws (χ^2=0.735, p=0.391). The increase in loss in the maxilla can be attributed to an increase in posterior tooth loss, while the decline in the mandible is likely the result of a decline in anterior tooth loss.

In females, Early Group premortem tooth loss (7.1%) is greater than Late Group tooth loss (5.6%) but not significantly. In the maxilla, there is a statistically significant decline in loss (FET=0.009), which can be attributed to a decline in loss of the incisors and molars. In the mandible, tooth loss increases slightly (7.0% : 9.3%), the result of an increase in posterior tooth loss.

Table 4.52. Premortem Tooth Loss, By Sex and Group in Adult and Adolescent (>15 years) Permanent Teeth from Ban Chiang

(# of Individuals) Jaw/Tooth Class	Early Group (EP I - IV)						Late Group (MP V - LP X)					
	Male (14)		Female (13)		Statistic		Male (17)		Female (20)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla Molars	4/71	5.6	5/38	13.2	FET	0.272	**6/49**	**12.2**	**2/64**	**3.1**	**FET**	**0.075**
Premolars	0/50	0.0	1/37	2.7	FET	0.425	**5/36**	**13.9**	**0/47**	**0.0**	**FET**	**0.013**
Canines	1/25	4.0	0/18	0.0	FET	1.000	0/17	0.0	0/22	0.0		
Incisors	1/49	2.0	3/31	9.7	FET	0.293	0/25	0.0	0/38	0.0		
Maxillary Tooth Loss	**6/195**	**3.1**	**9/124**	**7.3**	**χ^2=2.957**	**0.085**	**11/127**	**8.7**	**2/171**	**1.2**	**χ^2=9.804**	**0.002**
Mandible Molars	12/71	16.9	7/49	14.3	χ^2=0.149	0.700	12/73	16.4	14/75	18.7	χ^2=0.127	0.722
Premolars	3/51	5.9	1/38	2.6	FET	0.633	1/52	1.9	3/53	5.7	FET	0.618
Canines	0/25	0.0	0/18	0.0			0/27	0.0	2/25	8.0	FET	0.226
Incisors	5/48	10.4	1/23	4.3	FET	0.656	**3/44**	**6.8**	**0/51**	**0.0**	**FET**	**0.096**
Mandibular Tooth Loss	20/195	10.3	9/128	7.0	χ^2=0.984	0.321	16/196	8.2	19/204	9.3	χ^2=0.166	0.684
Total Premortem Loss	26/390	6.7	18/252	7.1	χ^2=0.054	0.816	27/323	8.4	21/375	5.6	χ^2=2.063	0.151

Note: FET=Fisher's Exact Test (two-tailed probabilities). Sixty-four individuals are represented: 31 males, 33 females. **Bold** indicates statistical significance (α=0.10).

Combining all teeth for an examination of group differences (Table 4.53), there are no significant differences between the two groups at Ban Chiang. There is evidence though, of a change in the pattern of tooth loss, both maxillary (3.9% : 0.0%) and mandibular (5.0% : 3.4%) anterior tooth loss declines over time; while posterior tooth loss increases (7.9% : 9.6%). If the anterior tooth loss can be attributed to deliberate extraction, then that cultural activity was predominant in the earlier time period.

Table 4.53. Summary of Premortem Tooth Loss, By Group, in Ban Chiang Adult Teeth

Jaw/Tooth Class		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	p
Maxilla	Molars	9/112	8.0	8/113	7.1	χ^2=0.074	0.786
	Premolars	1/91	1.1	5/83	6.0	FET	0.104
	Canines	1/45	2.2	0/39	0.0	FET	1.000
	Incisors	4/82	4.9	0/63	0.0	FET	0.133
Total Maxilla		15/330	4.5	13/298	4.4	χ^2=0.012	0.912
Mandible	Molars	19/124	15.3	26/148	17.6	χ^2=0.246	0.620
	Premolars	4/93	4.3	4/105	3.8	FET	1.000
	Canines	0/45	0.0	2/52	3.8	FET	0.497
	Incisors	6/75	8.0	3/95	3.2	FET	0.185
Total Mandible		29/337	8.6	35/400	8.8	χ^2=0.005	0.945
Total		44/667	6.6	48/698	6.9	χ^2=0.043	0.837

Note: Early Group includes EPI-EPIV, Late Group includes EPV-LPX. Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 65 individuals: 31 males, 33 females, 1 ?sex. **Bold** indicates statistical significant (α=0.10).

Using the subsample of individuals with age-interval estimates (i.e. no "adults"), and examining the prevalence of premortem tooth loss by general age categories and group (Table 4.54), documents no obvious differences in trend. Except for the three teeth lost in the youngest age interval in the Early Group, premortem tooth loss occurs after the age of 35 years in a generally consistent manner.

Table 4.54. Summary of Premortem Tooth Loss By Group and Age in Ban Chiang Permanent Teeth

Age Category*	Early Group (EP I - EP IV)			Late Group (EP V - LPX)			Statistic
	A/O	%	# Indiv.	A/O	%	# Indiv.	
Young	3/169	1.8	6	0/187	0.0	9	FET=0.106
Middle-aged	23/370	6.2	14	28/302	9.3	16	χ^2=2.213
Old	5/26	19.2	2	2/21	9.5	1	FET=0.436
Total	31/565	5.5	22	30/510	5.9	26	

* Only individuals with specific (5 year interval) age estimates are included here: 23 males, 24 females and 1 ?sex individual. Note: A=affected, O=observed, #=number, FET=Fisher's Exact Test (two-tailed probability). **Bold** indicates statistical significance (α=0.10).

Summary of Premortem Tooth Loss

Although deliberate tooth ablation has been identified in other archaeological samples from Thailand, no clear patterns could be established in the remains from Ban Chiang. This discussion of premortem tooth loss includes teeth possibly lost through deliberate activity. There is a low prevalence of premortem loss in all teeth (6.7%, 92/1365), which is greater in the posterior teeth, molars and premolars, (8.7%) compared to the anterior teeth (3.2%). Male teeth (7.4%) are lost slightly more often than female teeth (6.2%), but the difference is not statistically significant. The largest sex difference in tooth loss is noted in the mandibular incisors: male 8.7%, female 1.4%; which may reflect deliberate targeting of these teeth, or greater use of the anterior teeth as tools in males. Premortem tooth loss is rare in individuals less than 35 years of age. The statistically significant sex difference in loss of the mandibular incisors may reflect deliberate evulsion of these teeth in males.

The prevalence of premortem tooth loss in male teeth increases in the Late Group at Ban Chiang (6.7% : 8.4%), while that in female teeth decreases (7.1% : 5.6%), neither difference is statistically significant. In the combined sample, there is a decline in premortem loss of the anterior teeth over time and an increase in premortem loss of the posterior teeth. Combining all teeth, there is no statistically significant difference in tooth loss over time (6.6% : 6.9%).

Caries

Dental caries were recorded by tooth in all permanent teeth at Ban Chiang. Although the type of caries was systematically scored, multiple caries in a single tooth were not recorded under this system. In cases of multiple caries in a single tooth, the predominant caries type was recorded. This discussion of caries will proceed from the general to the more particular, beginning with an overall caries frequency, examination of sex and age differences, and finally a look at the predominant types of caries.

Table 4.55. Caries in Ban Chiang Subadult (<15 Years) Permanent Teeth

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/8	0/4	0/2	0/4	0/18	0/9	0/4	0/2	0/8	0/23	0/41
Female	0/2	0/0	0/0	0/1	0/3	0/3	0/0	0/0	0/1	0/4	0/7
? Sex	0/4	0/2	0/1	0/4	0/11	0/4	0/4	0/2	0/6	0/16	0/27
Total	0/14	0/6	0/3	0/9	0/32	0/16	0/8	0/4	0/15	0/43	0/75

Note: 7 individual burials (3 males, 2 females, 2 ?sex) are represented. M=molar, P=premolar, C=canine, I=incisor.

Examination of the occurrence of caries in the Ban Chiang permanent teeth, by general age categories, reveals an absence of caries in the permanent teeth of individuals less than approximately 15 years of age (Table 4.55). The youngest individual with caries of the permanent teeth is a late adolescent female with caries of both of the maxillary second molars. Since it is important to include all occurrences of caries, individuals aged more than 15 years will be combined with the adults for subsequent discussion.

The occurrence of caries, by type and sex, in the permanent teeth of individuals more than 15 years old (n=65) is presented in Table B.13. Lumping all of the types of caries together for this discussion, caries are uncommon, occurring in only 7.0% (76/1093) of the teeth examined. Caries are more common in males (8.1%, 45/553) than in females (6.0%, 31/514), and are almost twice as common in mandibular teeth (8.2%, 46/563) compared to maxillary teeth (5.7%, 30/530). As expected, the molars (14.5%, 58/401) are more susceptible to caries and are affected more often than any other tooth class. The canines are next, with 6.1% (9/148) carious teeth, followed by the incisors (2.3%, 5/221), and premolars (1.5%, 5/323).

Table 4.56. Prevalence of Caries, By Sex, in Adult and Adolescent (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla M3	7/29	24.1	3/19	15.8	FET	0.719
M2	4/35	11.4	5/35	14.3	FET	1.000
M1	1/36	2.8	3/35	8.6	FET	0.357
P4	0/36	0.0	0/42	0.0		
P3	1/37	2.7	0/36	0.0	FET	1.000
C	3/32	9.3	0/34	0.0	FET	0.108
I2	2/33	6.0	0/27	0.0	FET	0.497
I1	0/31	0.0	1/22	4.5	FET	0.415
Total Maxillary Caries	18/269	6.7	12/250	4.8	χ^2=0.851	0.356
Mandible M3	6/28	21.5	5/23	21.7	FET	1.000
M2	8/40	20.0	6/34	17.6	χ^2=0.066	0.797
M1	7/40	17.5	3/39	7.7	FET	0.311
P4	1/44	2.3	1/40	2.5	FET	1.000
P3	0/42	0.0	1/37	2.7	FET	0.468
C	3/43	6.9	3/35	8.6	FET	1.000
I2	1/28	3.6	0/29	0.0	FET	0.491
I1	1/19	5.3	0/27	0.0	FET	0.413
Total Mandibular Caries	27/284	9.5	19/264	7.2	χ^2=0.949	0.330
Total Caries	45/553	8.1	31/514	6.0	χ^2 =1.787	0.181

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 64 individuals: 31 males, 33 females; 60 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Sex differences in the occurrence of caries in each tooth class, by jaw, are summarized in Table 4.56. Again, it is evident that caries are more common in the second and third molars of both jaws, and the teeth of the mandible, as opposed to the maxilla. The first molars are less affected by caries because of their earlier eruption and effect of attrition on the fissures of the occlusal surface. Males have more caries of the maxillary (6.7% : 4.8%) and mandibular (9.5% : 7.2%) teeth than females, but none of the sex differences in caries prevalence is statistically significant (α=0.10).

Although there are no significant differences in the prevalence of caries by sex, there may be sex differences in caries origins or types. Referring to Table B.9, six major categories of caries origins are found in the Ban Chiang permanent teeth: occlusal, interproximal, crown, cemento-enamel junction (CEJ), and huge caries (indeterminate origin). Because the number of caries is quite small, there is little to be gained by examining a per tooth distribution of types; however, by combining tooth classes (i.e. molars, premolars, *etc.*) a pattern may be evident (Table 4.57).

As expected, caries are most common, and more variable in site of origin in the molars of both jaws, because of the complex crown morphology and larger surface area. In the maxillary molars, female caries are predominately occlusal (81.1%); while in males, the CEJ (41.6%), interproximal (25.0%), and huge (25.0%) caries are present. In the mandibular molars, again, female caries are predominately occlusal in origin (78.6%), while in males, the occlusal (42.9%) and interproximal (47.6%) sites predominate. Caries in the premolars are restricted to the interproximal surfaces in both sexes and both jaws. Canine caries are also variable, encompassing all six of the site codes in male teeth, while in female canines caries are restricted to the occlusal surface (a location likely the result of attritional exposure of the pulp chamber). Incisor caries are rare in the mandible and in the female maxillary teeth.

Table 4.57. Distribution of Ban Chiang Permanent Tooth Caries By Jaw, Sex, Tooth Class and Type

Tooth Class/ Caries Type		Maxilla				Mandible			
		Male		Female		Male		Female	
		n/A	%	n/A	%	n/A	%	n/A	%
Molar	occlusal	1/12	8.3	9/11	81.1	9/21	42.9	11/14	78.6
	interproximal	3/12	25.0	1/11	9.1	10/21	47.6	2/14	14.3
	crown	0/12	0.0	0/11	0.0	0/21	0.0	1/14	7.1
	CEJ	5/12	41.6	1/11	9.1	0/21	0.0	0/14	0.0
	huge	3/12	25.0	0/11	0.0	2/21	9.5	0/14	0.0
Premolar	interproximal	1/1	100.0	0/0	0.0	1/1	100.0	2/2	100.0
Canine	occlusal	0/3	0.0	0/0	0.0	1/3	33.3	3/3	100.0
	interproximal	1/3	33.3	0/0	0.0	1/3	33.3	0/3	0.0
	crown	1/3	33.3	0/0	0.0	0/3	0.0	0/3	0.0
	CEJ	1/3	33.3	0/0	0.0	0/3	0.0	0/3	0.0
	huge	0/3	0.0	0/0	0.0	1/3	33.3	0/3	0.0
Incisor	interproximal	1/2	50.0	0/1	0.0	1/2	50.0	0/0	0.0
	crown	0/2	0.0	1/1	100.0	0/2	0.0	0/0	0.0
	huge	1/2	50.0	0/1	0.0	1/2	50.0	0/0	0.0
Total	occlusal	1/18	5.5	9/12	75.0	10/27	37.0	14/19	73.7
	crown	1/18	5.5	1/12	8.3	0/27	0.0	1/19	5.3
	CEJ	6/18	33.3	1/12	8.3	0/27	0.0	0/19	0.0
	interproximal	6/18	33.3	1/12	8.3	13/27	48.1	4/19	21.1
	huge	4/18	22.2	0/12	0.0	4/27	14.8	0/19	0.0

Note: CEJ=cemento-enamel junction, n=number, A=affected.

While there are apparent differences in the site of origin of caries between males and females, because the number of caries is so small, it is not feasible to statistically test this difference without collapsing the categories. The caries distribution in the premolars and incisors cannot be tested for significance. By combining caries which originate on surfaces other than the occlusal surface: i.e. interproximal, crown, CEJ; and omitting the "huge" caries because of indeterminate origin, the tables can be reduced to 2 x 2 tables with sufficient size to be analyzed using the χ^2 statistic or the Fisher's Exact Test (Table 4.58).

These tests indicate that there is a significant sex difference in the site of origin of caries in the maxillary molars, and in the combined caries of both the maxilla and the mandible. In the maxillary molars and total maxillary teeth, female caries are predominately occlusal in origin and male caries are non-occlusal. In the mandibular teeth, female caries are also predominately occlusal, but male caries are evenly distributed. The cause of this difference is not obvious, but may be related to differences in attrition, calculus formation, enamel thickness, betel nut chewing, etc. Examination of the caries origins over time may further illuminate causes of this difference.

Table 4.58. Statistical Analyses of Caries Types in Molars and Canines, By Sex and Jaw

Tooth Class*/ Caries Type	Maxilla					Mandible				
	Male		Female		Test	Male		Female		Test
	n/A	%	n/A	%		n/A	%	n/A	%	
Molars										
occlusal	**1/9**	**11.1**	**9/11**	**81.8**	**FET= 0.0055**	**9/19**	**47.4**	**11/14**	**78.6**	**χ^2= 3.287 p= 0.070**
non-occlusal	**8/9**	**88.9**	**2/11**	**18.2**		**10/19**	**52.6**	**2/14**	**14.3**	
Canines										
occlusal						1/2	50.0	3/3	100.0	FET= 0.400
non-occlusal						1/2	50.0	0/3	0.0	
Total Caries										
occlusal	**1/14**	**7.1**	**9/12**	**75.0**	**FET= 0.0008**	**10/23**	**43.5**	**14/19**	**73.7**	**χ^2= 3.876 p= 0.049**
non-occlusal	**13/14**	**92.9**	**3/12**	**25.0**		**13/23**	**56.5**	**5/19**	**26.3**	

* Caries in teeth not shown were of insufficient number or variety for separate analysis, but are included in the final totals. Huge caries are not included in the statistical analysis. Note: n=number, A=affected, FET=Fisher's Exact Test. **Bold** indicates statistical significance (α=0.10).

Final analysis of caries in the Ban Chiang permanent teeth focuses on age. Since there is no statistical difference in the prevalence of caries by sex, the sexes may be collapsed for an analysis of caries occurrence by age. Using individuals with five-year interval age estimates only, and lumping all types of caries, the distribution of caries is shown in Table 4.59 [Note: This is a sub-sample of 49 individuals from the total sample of 65. The number of available teeth declines from 1093 to 906]. All of the caveats addressed in the paleodemography section regarding the under-aging of adult skeletons would apply to interpretation of this table. There are very few aged individuals, and the large number of middle-aged adults is reflected in the relatively larger number of available teeth in this age interval.

General observations include the absence of caries of the premolars and anterior teeth (canines and incisors) until middle-age (40-50 years), suggesting that caries in these teeth may be related to attritional exposure of the pulp chamber. The molars are the first teeth to be affected by caries, beginning with the first molar by late adolescence, and the third molar at the 25-30 year age interval. The highest frequency of caries occurs in the 20-25 year age interval in the maxilla (22.2%) and overall (12.5%), and in the 25-30 year interval in the mandible (13.1%). Small sample sizes complicate observations of caries in advanced age, but common sense would dictate a declining prevalence because of premortem tooth loss and advancing attrition.

Table 4.59. Summary of Caries Frequency by Age in Ban Chiang Permanent Teeth (Individuals >15 years of age)

Teeth A/O	Age Interval in Years (Number of Individuals)									Total (49)	
MAXILLA	15-20 (7)	20-25 (1)	25-30 (5)	30-35 (2)	35-40 (12)	40-45 (7)	45-50 (11)	50-55 (1)	55-60 (2)		
M3	0/4	0/0	3/8	0/3	2/12	2/3	3/11	0/1	0/0	10/42	6.4%
M2	0/8	1/2	0/10	0/4	2/14	1/4	3/13	0/0	0/1	7/56	12.5%
M1	1/9	1/2	0/9	0/4	1/14	0/5	1/13	0/1	0/1	4/58	6.9%
Premolars	0/20	0/4	0/19	0/6	0/33	1/14	0/31	0/2	0/3	1/132	0.8%
Canine	0/8	0/0	0/7	0/2	0/17	0/7	1/14	0/1	0/2	1/58	1.7%
Incisors	0/10	0/1	0/18	0/4	0/28	0/11	1/26	0/2	1/2	2/102	2.0%
Total Maxilla	1/59 1.7%	2/9 22.2%	3/71 4.2%	0/23 0.0%	5/118 4.2%	4/44 9.1%	9/108 8.3%	0/7 0.0%	1/9 11.1%	25/448	5.6%
MANDIBLE											
M3	0/6	0/1	3/6	0/4	2/11	2/3	1/10	0/0	0/1	8/42	19.0%
M2	1/8	1/2	3/9	0/4	3/16	0/6	3/14	0/0	0/1	11/60	18.3%
M1	1/7	0/2	2/9	0/4	0/15	1/10	3/14	0/1	0/2	7/64	10.9%
Premolars	0/16	0/4	0/17	0/7	0/30	0/19	2/36	0/3	0/4	2/136	1.5%
Canine	0/8	0/2	0/7	0/4	0/14	0/7	3/18	0/2	0/2	3/64	4.7%
Incisors	0/11	0/4	0/13	0/8	0/21	0/11	0/22	0/1	0/1	0/92	0.0%
Total Mandible	2/56 3.5%	1/15 6.7%	8/61 13.1%	0/31	5/107 4.7%	3/56 5.4%	12/114 10.5%	0/7 0.0%	0/11 0.0%	31/458	6.8%
ALL TEETH	3/115 2.6%	3/24 12.5%	11/132 8.3%	0/54 0.0%	10/225 4.4%	7/100 7.0%	21/222 9.5%	0/14 0.0%	1/20 5.0%	56/906	6.2%

Note: A=affected, O=observed, M=molar. Only individuals with specific (5 year interval) age estimates are included here: 23 males, 24 females and 1 ?sex individual.

Examining caries origin, by age interval (Table 4.60), suggests that in younger individuals with less attrition of the molar fissures, occlusal caries are most common. Caries originating at the CEJ, interproximal, and the non-occlusal surfaces of the crown, are more common in the later age intervals. This may be the result of attrited loss of the occlusal surface, as well as the effect of accumulated calculus.

Table 4.60. Caries Origin, By Age, in Ban Chiang Adult Teeth (Individuals >15 years of age)

Caries Origin	Age Interval in Years (Number of Individuals)								
Caries Present	15-20 (7)	20-25 (1)	25-30 (5)	30-35 (2)	35-40 (12)	40-45 (7)	45-50 (11)	50-55 (1)	55-60 (2)
Occlusal	2	2	9	0	7	3	5	0	0
Interproximal	0	0	1	0	2	2	9	0	0
Crown	1	0	0	0	0	0	0	0	1
CEJ	0	1	0	0	1	0	5	0	0
Huge	0	0	1	0	0	2	2	0	0
Total (56) % of total	3 5.4%	3 5.4%	11 19.6%	0 0.0%	10 17.8%	7 12.5%	21 37.5%	0 0.0%	1 1.8%

Note: A=affected, O=observed, CEJ=cemento-enamel junction. Forty-nine burials with specific (5 year interval) age estimates are included here: 23 males, 25 females, 1 ?sex individual.

Table 4.61. Caries Prevalence, By Age and Sex, in Ban Chiang Adult Teeth

Sex	Age Interval in Years (# of Individuals)								
A/O (# individuals)	15-20 (6)	20-25 (1)	25-30 (5)	30-35 (2)	35-40 (12)	40-45 (7)	45-50 (11)	50-55 (1)	55-60 (2)
Male	0/2 (1)	0/0 (0)	5/70 (3)	0/23 (1)	3/121 (6)	4/65 (4)	16/154 (7)	0/14 (1)	0/0 (0)
Female	3/87 (5)	3/24 (1)	6/62 (2)	0/31 (1)	7/104 (6)	3/35 (3)	5/68 (4)	0/0 (0)	1/20 (2)

Note: A=affected, O=observed. Includes 48 burials with specific (5 year interval) age estimates: 23 males, 24 females.

Recalling that males have more caries than females overall, Table 4.61, the distribution of caries by age and sex, reveals an apparent tendency for females to get caries at an earlier age than males. This tendency was also reflected in the greater number of occlusal surface caries found in females, and in the appearance of molar caries by late adolescence. By late middle-age, the number of caries in male teeth surpasses that in female teeth. These observations must be tempered by the very small numbers of individuals represented in these teeth.

Temporal Comparisons of Caries

An increasing prevalence of caries is associated with advancing technology in agriculture and food processing. With a movement toward processed and cooked grains (increased sucrose), and reliance on increasingly restrictive selection of foodstuffs, attrition decreases and caries increases. Chief among the questions of caries prevalence at Ban Chiang over time is: Does the prevalence increase in the Late Group? This is what would be expected using the maize agriculture model of the American Indian. In addition, does the caries prevalence remain the same in males and females, do the origins of the caries change over time, and does the caries distribution relative to age change over time?

Prior to an analysis of caries prevalence, it should be determined that the absence of significant differences between the sexes evident in the whole sample persists in the temporal sub-samples (Table 4.62). In the Early Group at Ban Chiang, male teeth (7.7%, 24/310) have more caries than female teeth (4.5%, 9/198), a pattern which persists in the Late Group but with less of a gap: 8.6% (21/244) in males and 7.0% (22/316) in females. Within each group, none of the frequency differences between the male and female teeth is statistically significant.

Table 4.62. Prevalence of Caries, By Sex and Group, in Adult and Adolescent (>15 years) Permanent Teeth from Ban Chiang

(# of Individuals) Affected/Observed Jaw/Tooth	Early Group (EP I - IV)						Late Group (MP V - LP X)					
	Male (14)		Female (13)		Statistic		Male (17)		Female (20)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla M3	5/17	29.4	0/5	0.0	FET	0.290	2/12	16.7	3/14	21.4	FET	1.000
M2	1/20	5.0	2/12	16.7	FET	0.540	3/15	20.0	3/23	13.0	FET	0.663
M1	1/21	4.8	0/15	0.0	FET	1.000	0/15	0.0	3/20	15.0	FET	0.244
P4	0/23	0.0	0/18	0.0			0/13	0.0	0/24	0.0		
P3	1/23	4.3	0/15	0.0	FET	1.000	0/14	0.0	0/21	0.0		
C	0/19	0.0	0/16	0.0			**3/10**	**23.1**	**0/18**	**0.0**	**FET**	**0.064**
I2	1/22	4.5	0/10	0.0	FET	1.000	1/11	9.1	0/17	0.0	FET	0.393
I1	0/20	0.0	1/7	14.3	FET	0.259	0/11	0.0	0/15	0.0		
Total Maxillary Caries	9/165	5.5	3/98	3.1	FET	0.544	9/104	8.7	9/152	5.9	χ^2=0.705	0.401
Mandible M3	3/13	23.1	2/8	25.0	FET	1.000	3/15	20.0	3/15	20.0	FET	1.000
M2	5/20	25.0	2/13	15.4	FET	0.676	3/20	15.0	4/21	19.0	FET	1.000
M1	5/23	21.7	1/18	5.6	FET	0.205	2/17	11.8	2/21	9.5	FET	1.000
P4	1/23	4.3	0/16	0.0	FET	1.000	0/21	0.0	1/24	4.2	FET	1.000
P3	0/22	0.0	1/15	6.7	FET	0.405	0/21	0.0	0/22	0.0		
C	1/21	4.8	0/16	0.0	FET	1.000	2/22	9.1	3/19	15.8	FET	0.649
I2	0/13	0.0	0/9	0.0			1/15	6.7	0/20	0.0	FET	0.429
I1	0/10	0.0	0/5	0.0			1/9	11.1	0/22	0.0	FET	0.290
Total Mandibular Caries	15/145	10.3	6/100	6.0	χ^2=1.426	0.232	12/140	8.6	13/164	7.9	χ^2=0.042	0.838
Total Caries	24/310	7.7	9/198	4.5	χ^2=2.032	0.154	21/244	8.6	22/316	7.0	χ^2=0.525	0.469

Note: M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test (two-tailed). **Bold** indicates statistical significance (α=0.10).

The increase in frequency of caries in female teeth from the Early Group (9/198, 4.5%) to the Late Group (22/316, 7.7%) is not statistically significant (χ^2=1.254, p=0.263). There is an increase in the number of female caries in both the maxilla (3.1% : 5.9%) and mandible (6.0% : 7.9%) in the Late Group, but these are not statistically significant differences (FET p =0.375 and χ^2=0.345, p=0.557 respectively). The increase in female caries in the Late Group is attributable to an increase in caries of the molars of both jaws and the mandibular canine.

In male teeth, caries frequency increases slightly in the Late Group (7.7% : 8.6%), a difference which is not statistically significant (χ^2=0.137, p=0.712). In males, there is a large increase in caries of the canine teeth (2.5% : 14.3%) in the Late Group which is statistically significant (FET p=0.073) and which may reflect an increase in dental attrition and exposure of the pulp.

Using the complete sample of adult permanent teeth in each of the group samples (i.e. including unknown sex individuals), the significance of differences in caries prevalence over time can be tested. A "by tooth type" analysis revealed no significant increases in caries between the Early and Late Groups at Ban Chiang. In the summary caries frequencies (Table 4.63) a trend toward increased caries can be seen, although caries frequency is still very low. This trend is supported by the statistically significant increase in canine caries. Inspection of the site of origin of the canine caries in these two sub-samples, shows the Early Group canine caries (N=1) occurs on the occlusal surface in a tooth with exposure of the pulp chamber; in the Late Group the canine caries (N=8) occur on all surfaces of the crown: interproximal, lingual crown and occlusal, and are often associated with advancing attrition.

Table 4.63. Summary of Caries Prevalence, By Group, in Ban Chiang Permanent Teeth (>15 years)

Teeth	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	p
Maxilla	12/274	4.4	18/256	7.0	χ^2=1.743	0.187
Mandible	21/260	8.1	25/304	8.2	χ^2=0.004	0.949
All Molars	27/193	14.0	31/208	14.9	χ^2=0.068	0.795
All Premolars	3/163	1.8	1/160	0.6	FET	0.623
All Canines	**1/76**	**1.3**	**8/72**	**11.1**	**FET**	**0.016**
All Incisors	2/102	2.0	3/120	2.5	FET	1.000
All Teeth	33/534	6.2	43/560	7.7	χ^2=0.950	0.330

Note: Early Group includes EPI-EPIV, Late Group includes EPV-LPX. A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 65 individuals: 31 males, 33 females, 1 ?sex. **Bold** indicates statistical significance (α=0.10).

Figure 4.24. Occlusal Surface Caries of the Maxillary Molars

Table 4.64. Distribution of Ban Chiang Permanent Tooth Caries By Jaw, Group, Tooth Class and Type

Tooth Class/ Caries Type		Maxilla				Mandible			
		Early Group		Late Group		Early Group		Late Group	
		n/A	%	n/A	%	n/A	%	n/A	%
Molar	Occlusal	2/9	22.2	8/14	57.1	8/18	44.4	12/17	70.6
	Interproximal	3/9	33.3	1/14	7.1	8/18	44.4	4/17	23.5
	Crown	0/9	0.0	0/14	0.0	1/18	5.6	0/17	0.0
	CEJ	1/9	11.1	5/14	35.7	0/18	0.0	0/17	0.0
	Huge	3/9	33.3	0/14	0.0	1/18	5.6	1/17	5.9
Premolar	Interproximal	1/1	100.0			2/2	100.0	1/1	100.0
Canine	Occlusal					1/1	100.0	3/5	60.0
	Interproximal			1/3	33.3	0/1	0.0	1/5	20.0
	Crown			1/3	33.3				
	CEJ			1/3	33.3				
	Huge					0/1	0.0	1/5	20.0
Incisor	Interproximal	0/2	0.0	1/1	100.0			1/2	50.0
	Crown	1/2	50.0	0/1	0.0				
	Huge	1/2	50.0	0/1	0.0			1/2	50.0
Total	Occlusal	2/12	16.7	8/18	44.4	9/21	42.9	15/25	60.0
	Interproximal	4/12	33.3	3/18	16.7	10/21	47.6	7/25	28.0
	Crown	1/12	8.3	1/18	5.6	1/21	4.8	0/25	0.0
	CEJ	1/12	8.3	6/18	33.3	0/21	0.0	0/25	0.0
	Huge	4/12	33.3	0/18	0.0	1/21	4.8	3/25	12.0

Note: CEJ=cemento-enamel junction, n=number, A=affected. Sixty-five individuals are represented: 28 Early Group, 37 Late Group. Early Group includes EPI-EPIV, Late Group includes EPV-LPX.

Since there is a change in the number of caries over time, it is advantageous to examine the site of origin of caries over time (Table 4.64). Since the number of caries are quite small, it is not efficient to examine each individual tooth, rather, summing the teeth into classes and examining them by jaw should provide sufficient detail. The small increase in total caries frequency between the groups is belied by the apparently large shift in caries origins toward the occlusal surface. For example, in the Early Group maxillary molars, caries are either huge (33.3%), interproximal (33.3%) or occlusal (22.2%) in origin; while in the Late Group, caries originate on the CEJ (35.7%) and the occlusal surface (57.1%). A similar shift is seen in the mandibular molars. Collapsing the caries categories further, a test of the significance of these differences is made (Table 4.65). None of the differences is statistically significant.

Table 4.65. Statistical Analyses of Caries Types in Molars and Canines, By Jaw and Group

Tooth Class/ Caries Type*	Maxilla					Mandible				
	Early		Late		Test	Early		Late		Test
	n/A	%	n/A	%		n/A	%	n/A	%	
Molars										
occlusal	2/6	33.3	8/14	57.1	FET= 0.628	8/17	47.1	12/16	75.0	χ^2= 2.695 p= 0.101
non-occlusal	4/6	66.7	6/14	42.9		9/17	52.9	4/16	25.0	
Canines										
occlusal						1/1	100.0	3/4	75.0	FET= 1.000
non-occlusal						0/1	0.0	1/4	25.0	
Total										
occlusal	2/8	25.0	8/18	44.4	FET= 0.420	9/20	45.0	15/22	68.2	χ^2= 2.299 p= 0.129
non-occlusal	6/8	75.0	10/18	55.6		11/20	55.0	7/22	31.8	

* Caries in the teeth not shown were of insufficient number or variety for separate analysis, but are included in the final totals. Huge caries are omitted from the statistical analysis. Note: n=number, A=affected, FET=Fisher's Exact Test (2-tailed probabilities). Early Group includes EP I - EP IV, Late Group includes EP V - LP X. **Bold** indicates statistical significance (α=0.10).

The question of a temporal change in caries prevalence by age is a complicated one because of the problems in accurate age estimates, the influence of sex, and other dental pathologies, as well as a reduction in the available tooth sample. However, a brief look at caries prevalence by group and using specific age categories is presented below (Table 4.66). The very limited number of burials in the old age category is suggestive of mortuary/aging bias. None of the caries frequencies is statistically significant, the only general notation that can be made from this distribution is that the overall caries frequencies are very nearly identical.

Table 4.66. Summary of Caries Prevalence, By Group and Age, in Ban Chiang Permanent Teeth

Age Interval* (in years)	Early Group (EP I - EP IV)			Late Group (EP V - LPX)			Statistic
	A/O	%	# Indiv.	A/O	%	# Indiv.	
Young	7/150	4.7	6	10/175	5.7	9	χ^2=0.179
Middle-aged	22/300	7.3	14	16/247	6.5	17	χ^2=0.153
Old	1/20	5.0	2	0/14	0.0	1	FET=1.000
Total	30/470	6.4	22	26/410	6.0	27	

* Only individuals with specific (5 year interval) age estimates are included here: 23 males, 24 females and 1 ?sex individual. Young=15-35 years, Middle-age=35-50 years, Old=50-60+ years. Note: A=affected, O=observed, n=number, FET=Fisher's Exact Test (two tailed probability). **Bold** indicates statistical significance (α=0.10).

Summary of Caries

In summary, caries are noted in 7.0% (76/1093) of the permanent teeth in the Ban Chiang sample (individuals greater than 15 years of age). Caries are more common in the mandibular teeth than the maxillary teeth, and in the molars of both jaws. Ban Chiang male teeth (8.1%) are more carious than the female teeth (6.0%), but this difference is not statistically significant.

There are statistically significant differences in caries origin between males and females in the maxillary molars, and all teeth of both jaws. Females have more occlusal surface caries than males. Caries occur at a younger age in female teeth than male teeth, with a prevalence of non-occlusal surfaces affected in the later age intervals. While the influence of age distribution and small sample size must not be discounted, it appears that there are real differences in the prevalence of caries between male and female teeth in the Ban Chiang sample. Gender differences in attrition, diet, cultural alterations of the teeth such as betel nut chewing, may explain these differences.

Caries prevalence increases in both male (7.7% : 8.6%) and female (4.5% : 7.0%) teeth over time. The increase in female caries is statistically significant. Collapsing the sexes, the caries frequency in all teeth increases from 6.2% (33/534) to 7.7% (43/560). The increase may be partially attributed to a large increase in canine caries (1.3% : 11.1%) in the Late Group.

With an increase in numbers of caries over time, caries origins appear to shift from non-occlusal to occlusal portions of the tooth crown, although none of the differences is statistically significant. There are no obvious changes in caries frequencies by age between the Early and Late Group samples.

Abscessing

Abscessing was scored as present or absent, by tooth socket observed. Although there are basically two types of abscessing - apical, at the tip of the root resulting from infection of the pulp cavity through caries or wear; and alveolar, resulting from infection of the gingival tissues. These two types were not distinguished in this analysis. No abscesses are noted in the permanent dentitions of individuals less than 15 years of age (Table 4.67) at Ban Chiang.

Table 4.67. Abscessing in Ban Chiang Subadult (<15 Years) Permanent Tooth Sockets

Sex A/O	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/6	0/4	0/2	0/4	0/16	0/6	0/3	0/2	0/4	0/15	0/31
Female	0/3				0/3	0/3			0/1	0/4	0/7
? Sex	0/2	0/2	0/1	0/2	0/7	0/4	0/4	0/2	0/4	0/14	0/21
Total	0/11	0/6	0/3	0/6	0/26	0/13	0/7	0/4	0/9	0/33	0/59

Note: 11 individual burials (4 males, 5 females, 2 ?sex) are represented. M=molar, P=premolar, C=canine, I=incisor, A=Affected, O=Observed.

In keeping with analysis of caries prevalence in the Ban Chiang dental remains, individuals aged 15 - 20 years are included with the adults in this discussion (Table 4.68). Abscesses are uncommon in the Ban Chiang skeletal sample, occurring in 6.1% of the tooth sockets examined (67/1097). Abscesses are more common in the mandible (7.1%, 42/591) than the maxilla (4.9%, 25/506). The highest frequency of abscessing occurs in the mandibular molars in both sexes, but the frequencies of abscessing of the maxillary third premolar in females (11.8%, 4/34), and the maxillary anterior tooth sockets in males seem unusually high. Abscessing is more common in male tooth sockets (7.2%, 43/596) than female sockets (4.8%, 24/501), a difference which is statistically significant. Evaluation of these abscesses indicates that they are generally apical, and occur in teeth with advanced wear, suggesting exposure and infection of the pulp chamber.

Table 4.68. Prevalence of Abscessing, By Sex, in Adult and Adolescent (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla M3	1/31	3.2	1/18	5.6	FET	1.000
M2	1/33	3.0	1/23	4.3	FET	1.000
M1	3/33	9.1	0/29	0.0	FET	0.241
P4	2/37	5.4	0/35	0.0	FET	0.493
P3	3/36	8.3	4/34	11.8	FET	0.706
C	2/35	5.7	0/35	0.0	FET	0.493
I2	2/34	5.9	2/31	6.5	FET	1.000
I1	3/33	9.1	0/29	0.0	FET	0.241
Total Maxillary Abscesses	17/272	6.3	8/234	3.4	χ^2=2.147	0.143
Mandible M3	4/31	12.9	3/23	13.0	FET	1.000
M2	8/43	18.6	2/36	5.6	FET	0.101
M1	8/44	18.2	5/39	12.8	χ^2=0.450	0.502
P4	1/46	2.2	1/39	2.6	FET	1.000
P3	2/47	4.3	1/37	2.7	FET	1.000
C	3/45	6.7	3/36	8.3	FET	1.000
I2	0/37	0.0	0/30	0.0		
I1	0/31	0.0	1/27	3.7	FET	0.466
Total Mandibular Abscesses	26/324	8.0	16/267	6.0	χ^2=0.916	0.339
Total Abscesses	**43/596**	**7.2**	**24/501**	**4.8**	**χ^2=2.790**	**0.095**

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 62 individuals: 29 males, 31 females; 58 adults (>20 years), 3 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Collapsing the sexes, and examining the prevalence of abscessing by age intervals (Table 4.69), using a subset of the Ban Chiang sample (N=45), should document the occurrence of abscessing later in life because of the prerequisite of advanced attrition. Abscesses are rare in the age intervals preceding the 40-45 year range, none are found in individuals aged less than 25-30 years (0/113 tooth sockets), and abscesses are rare in the fourth decade (10/408, 2.5%). In the maxilla, abscessing peaks (8.9%) in the 40-45 year interval and declines rather sharply afterward, while in the mandible, the prevalence of abscessing is sustained through the remaining age intervals. These results support the assertion that many of the abscesses are resulting from attritional exposure of the pulp chamber.

Figure 4.25. Abscess of the Left Mandibular First Molar Socket

Table 4.69. Abscessing Prevalence, By Age, in Ban Chiang Permanent Tooth Sockets (Individuals >15 years of age)

Tooth A/O	Age Interval in Years (Number of Individuals)									Total (45)	
MAXILLA	15-20 (6)	20-25 (1)	25-30 (5)	30-35 (2)	35-40 (11)	40-45 (6)	45-50 (11)	50-55 (1)	55-60 (2)		
M3	0/2		1/7	0/3	0/11	0/5	0/12	0/1		1/41	2.4
M2	0/4		0/8	0/4	1/12	1/4	0/12			2/44	4.5
M1	0/5		0/8	0/3	1/15	0/4	1/12	0/1		2/48	4.2
Premolars	0/12	0/4	0/18	0/5	1/34	1/14	3/31	0/2		5/120	4.2
Canine	0/5	0/2	0/9	0/2	0/17	0/7	0/15	0/1		0/58	0.0
Incisors	0/10	0/4	0/18	0/2	0/30	2/11	1/31	0/2		3/108	2.8
Total Maxilla	0/38 0.0%	0/10 0.0%	1/68 1.5%	0/19 0.0%	3/119 2.5%	4/45 8.9%	5/113 4.4%	0/7 0.0%		13/419	3.1
MANDIBLE											
M3	0/5		2/6	0/4	0/12	2/4	2/12	1/2		7/45	15.6
M2	0/8	0/2	0/8	0/4	1/17	2/8	4/16	1/2		8/65	12.3
M1	0/7	0/2	0/9	0/4	1/16	2/10	7/16	0/2	0/3	10/69	14.5
Premolars	0/13	0/4	0/17	0/7	0/29	0/19	3/36	0/4	1/5	4/134	3.0
Canine	0/7	0/2	0/8	0/2	2/15	0/9	0/17	0/1	0/2	2/63	3.2
Incisors	0/11	0/4	0/14	0/4	0/26	1/17	0/26	0/1	0/1	1/104	1.0
Total Mand.	0/51 0.0%	0/14 0.0%	2/62 3.2%	0/25 0.0%	4/115 3.5%	7/67 10.4%	16/123 13.0%	2/12 16.7%	1/11 9.1%	32/480	6.7
ALL TEETH	0/89 0.0%	0/24 0.0%	3/130 2.3%	0/44 0.0%	7/234 3.0%	11/112 9.8%	21/236 8.9%	2/19 10.5%	1/11 9.1%	45/899	5.0

Note: A=affected, O=observed, M=molar. Only individuals with specific (5 year interval) age estimates are included here: 21 males, 23 females and 1 ?sex individual.

The presence of a higher prevalence of abscessing in male tooth sockets might suggest a difference in age-at-occurrence. Table 4.70 presents the number of individuals and prevalence of abscessing by age interval in the Ban Chiang sample. There is no apparent difference in the sexes of abscessing age-at-occurrence, although the absence of young adult males makes any conclusions tentative. The highest prevalence of abscesses in males occurs in the 45-50 year age interval, while in females, the peak is slightly earlier (20.5%, 40-45 year interval).

Table 4.70. Abscessing Prevalence, By Age and Sex, in Ban Chiang Permanent Tooth Sockets

Sex		Age Interval in Years								
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
♂	# indiv	(0)	(0)	(3)	(1)	(6)	(3)	(7)	(1)	(0)
	A/O			0/68	0/21	4/134	2/68	18/165	2/19	
	%			0.0	0.0	3.0	2.9	10.9	10.5	
♀	# indiv	(5)	(1)	(2)	(1)	(5)	(3)	(4)	(0)	(2)
	A/O	0/73	0/24	3/62	0/23	3/100	9/44	3/71		1/11
	%	0.0	0.0	4.8	0.0	3.0	20.5	4.2		9.1

Note: A=affected, O=observed, ♂ male, ♀ female, #=number, indiv=individuals. Includes 47 burials with specific (5 year interval) age estimates: 21 males, 23 females.

Temporal Trend in Abscessing

Abscessing of the dental hard tissues is only slightly more common in the Late Group (6.6%, 36/548) than in the Early Group (5.5%, 31/565) at Ban Chiang (χ^2=0.576) [Table 4.71]. In the Early Group, abscessing is more common in female tooth sockets (6.9%, 14/204) than

Table 4.71. Prevalence of Abscesses, By Sex and Group, in Adult and Adolescent (>15 years) Permanent Tooth Sockets from Ban Chiang

(# of Individuals) Jaw/Tooth Socket	Early Group (EP I - IV)						Late Group (MP V - LP X)					
	Male (14)		Female (13)		Statistic		Male (15)		Female (19)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla M3	0/20	0.0	0/6	0.0			1/11	9.1	1/12	8.3	FET	1.000
M2	1/20	5.0	0/8	0.0	FET	1.000	0/13	0.0	1/15	6.7	FET	1.000
M1	1/20	5.0	0/12	0.0	FET	1.000	2/13	15.4	0/17	0.0	FET	0.179
P4	1/24	4.2	0/16	0.0	FET	1.000	1/13	7.7	0/19	0.0	FET	0.406
P3	1/24	4.2	3/15	20.0	FET	0.279	2/12	16.7	1/19	5.3	FET	0.543
C	0/22	0.0	0/16	0.0			2/13	15.4	0/19	0.0	FET	0.157
I2	1/23	4.3	2/13	15.4	FET	0.539	1/11	9.1	0/18	0.0	FET	0.379
I1	0/22	0.0	0/10	0.0			**3/11**	**27.3**	**0/19**	**0.0**	**FET**	**0.041**
Total Maxillary	5/175	2.9	5/96	5.2	FET	0.332	**12/97**	**12.4**	**3/138**	**2.2**	**χ^2=9.912**	**0.002**
Mandible M3	3/15	20.0	1/9	11.1	FET	1.000	1/16	6.3	2/14	14.3	FET	0.586
M2	4/22	18.2	1/14	7.1	FET	0.628	4/21	19.0	1/22	4.5	FET	0.185
M1	3/23	13.0	5/18	27.8	FET	0.267	**5/21**	**23.8**	**0/21**	**0.0**	**FET**	**0.048**
P4	1/23	4.3	1/18	5.6	FET	1.000	0/23	0.0	0/21	0.0		
P3	1/24	4.2	0/15	0.0	FET	1.000	1/23	4.3	1/22	4.5	FET	1.000
C	0/23	0.0	0/15	0.0			3/22	13.6	3/21	14.3	FET	1.000
I2	0/21	0.0	0/11	0.0			0/16	0.0	0/19	0.0		
I1	0/19	0.0	1/8	12.5	FET	0.296	0/12	0.0	0/19	0.0		
Total Mandibular	12/170	7.1	9/108	8.3	χ^2=0.154	0.695	**14/154**	**9.1**	**7/159**	**4.4**	**χ^2=2.747**	**0.097**
Total Abscesses	17/345	4.9	14/204	6.9	χ^2=0.901	0.342	**26/251**	**10.4**	**10/297**	**3.4**	**χ^2=10.83**	**0.001**

Note: M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test (two-tailed probabilities). **Bold indicates statistical significance** (α=0.10).

male tooth sockets (17/345, 4.9%), a trend evident in both the maxilla and mandible, but which is not statistically significant. In the Late Group, the sex differences are statistically significant, with a higher prevalence of abscesses in males than in females in the maxilla (12.4% : 2.2%) and the mandible (9.1% : 4.4%), as well as in total sockets (10.4%: 3.4%).

Comparing the groups (Table 4.72), there is a decline in abscessing in female tooth sockets in the Late Group in both jaws and in all sockets (6.9% : 3.4%). While in males, there is a substantial increase in abscessing of the maxillary tooth sockets (2.9% : 12.4%), which contributes to a significant increase in abscessing in all male sockets (4.9% : 10.4%). This increase is distributed over all tooth sockets in the maxilla, rather than being isolated within a single tooth class (See Table 4.71). When the sexes are combined, the abscessing frequency in Early Group sockets (5.5%, 31/565) is only slightly less than that in the Late Group (6.6%, 36/548). Certainly, the increase in male abscessing in the Late Group is suggestive of an increase in older aged individuals, increased dental attrition, or increased caries; while the decline in female abscessing rates in the Late Group may be explained by a lack of aged individuals.

Table 4.72. Abscessing Prevalence, By Sex and Group, in Ban Chiang Permanent Tooth Sockets

Tooth Sockets		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	p
Male	Maxilla	**5/175**	**2.9**	**12/97**	**12.4**	**χ^2=9.641**	**0.002**
	Mandible	12/170	7.1	14/154	9.1	χ^2=0.452	0.501
	All Sockets	**17/345**	**4.9**	**26/251**	**10.4**	**χ^2=6.402**	**0.011**
Female	Maxilla	5/96	5.2	3/138	2.2	FET	0.278
	Mandible	9/108	8.3	7/159	4.4	χ^2=1.764	0.184
	All Sockets	**14/204**	**6.9**	**10/297**	**3.4**	**χ^2=3.240**	**0.072**
All Sockets (M & F)		31/565	5.5	36/548	6.6	χ^2=0.576	0.448

Note: Early Group includes EPI-EPIV, Late Group includes EPV-LPX. Includes 62 individuals: 29 males, 32 females, 1 ?sex. A=affected, O=observed, M=male, F=female, FET=Fisher's Exact Test (2-tailed probability). **Bold** indicates statistical significance (α=0.10).

Summary of Adult Abscessing

Abscessing is uncommon in the Ban Chiang permanent tooth sockets (6.1%, 67/1097). Abscessing is found more often in the mandible than the maxilla, and is found at all tooth sites. Male tooth sockets (7.2%, 43/596) are more often abscessed than female tooth sockets (4.8%, 24/501). Dental abscessing is rare in the early adult age intervals, peaking in the fifth decade of life and declining thereafter. There are no apparent sex differences in the age distribution of abscessing.

The individuals in the Late Group at Ban Chiang have a slightly higher prevalence of dental abscessing (6.6%) than those in the Early Group (5.5%), a difference which is not statistically significant. Female tooth sockets (6.9%) have a higher abscessing prevalence in the Early Group than male sockets (4.9%), but the difference is not statistically significant. In the Late Group, there are significant sex differences in the maxillary incisor sockets, all maxillary sockets, mandibular first molar sockets, and in all tooth sockets, with males outscoring females (10.4% : 3.4%, respectively).

Examining temporal changes in abscessing at Ban Chiang, shows a decline in abscessing in female tooth sockets, and a statistically significant increase in abscessing in male tooth sockets in the Late Group. This increase must be evaluated with the patterns of attrition and age distribution of the samples, but is suggestive of a change in diet or dental function.

Periodontal Disease

Two aspects of periodontal disease: alveolar resorption and calculus, are discussed in this section.

Alveolar Resorption

Resorption of the alveolar bone of the maxilla and mandible was scored at each tooth socket on a four point scale reflecting the amount of porosity of the cortical surface: none, slight, moderate and marked. This is a highly subjective method and, as discussed in the methods section, varies greatly from the past definition and scoring system which was based upon the amount of tooth root exposed. Often, preservation of the northeast Thailand remains included a thin hard film of grey mud or mineral, as well as hard concretions which obscured the cortical surface and compromises observations.

Discussions of alveolar resorption are, like caries and abscessing, somewhat a function of age. The higher degrees of resorption are expected in the later age intervals. No cases of alveolar resorption were noted in individuals less than 15 years of age (Table 4.73).

Table 4.73. Alveolar Resorption in Ban Chiang Subadult (<15 Years) Permanent Tooth Sockets

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/6	0/3	0/1	0/3	0/13	0/3	0/4	0/2	0/4	0/13	0/26
Female	0/2	0/1		0/1	0/4	0/1	0/2			0/3	0/7
? Sex	0/2	0/2	0/1	0/2	0/7	0/3	0/4	0/2	0/4	0/13	0/20
Total	0/10	0/6	0/2	0/6	0/24	0/7	0/10	0/4	0/8	0/29	0/53

Note: 6 individual burials (3 males, 2 females, 1 ?sex) are represented. M=molar, P=premolar, C=canine, I=incisor.

The occurrence of various degrees of alveolar resorption in all adult permanent tooth sockets at Ban Chiang is presented in Table B.14. There is slightly more alveolar resorption in the maxillary teeth (44.9%, 193/430) than in the mandibular teeth (36.9%, 178/482), but the presence of advanced resorption [moderate and marked] is identical (2.3%). In the tooth classes, the amount of resorption declines from the molars (48.9%, 160/327) to the incisors (28.9%, 57/197). In all adult permanent tooth sockets, the frequency of slight resorption is 28.0% (255/912), moderate resorption 10.4% (95/912) and marked resorption 2.3% (21/912).

Evaluation of the "by tooth" comparison of male and female alveolar resorption demonstrates that males have more resorption than females in every tooth class. Making the prevalence of alveolar resorption (51.3% : 29.3%), and the amount of advanced resorption greater in male tooth sockets (16.7%, 80/478) than in female tooth sockets (8.5%, 36/426). Statistical testing of these differences, combining the absent and slight categories (Table 4.74), documents highly significant differences in the maxilla, mandible, and in all tooth sockets. The age-at-death distribution of the individuals in this analysis is skewed toward young adult females and middle-aged males, which may explain the large differences seen here.

Table 4.74. Prevalence of Alveolar Resorption, By Sex, in Adult Permanent Tooth Sockets

Jaw/Degree of resorption Affected/Observed		Male		Female		Statistics	
		A/O	%	A	%	Test	*p*
Maxilla	Absent/slight	173/220	78.6	186/208	89.4	**χ^2=9.200**	**0.002**
	Advanced	47/220	21.4	22/208	10.6		
Mandible	Absent/slight	225/258	87.2	204/218	93.6	**χ^2=5.386**	**0.020**
	Advanced	33/258	12.8	14/218	6.4		
Total Sockets	Absent/slight	398/478	83.3	390/426	91.5	**χ^2=13.825**	**0.000**
	Advanced	80/478	16.7	36/426	8.5		

Note: A=affected. Includes 56 individuals: 27 males, 29 females; 53 adults (>20 years), 3 adolescents. **Bold** indicates statistical significance (α=0.10).

Table 4.75. Summary of Alveolar Resorption by Age in Ban Chiang Permanent Tooth Sockets (Individuals >15 years of age)

Degree	Age Interval in Years (Number of Individuals)									Total (49)	
Observed A/O %	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (14)	40-45 (11)	45-50 (6)	50-55 (4)	55-60 (9)		
Maxilla	40	10	60	11	106	36	87	7		357	
asent	82.5	100	71.7	72.7	65.1	13.9	36.8	0.0		200	56.0
slight	17.5		28.3	27.3	28.3	52.8	29.9	100.0		109	30.5
moderate					6.6	33.3	24.1			40	11.2
marked							8			8	2.2
Mandible	40	14	61	23	92	55	101	5	10	401	
absent	95.0	92.9	73.8	87.0	65.2	61.8	34.7	100.0	80.0	258	64.3
slight	5.0	7.1	19.7	13.0	28.3	32.7	41.6		20.0	106	26.4
moderate			6.6		6.5	5.5	12.9			26	6.5
marked							10.9			11	2.7

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 20 males, 21 females, 1 ?sex.

The degree of alveolar resorption increases with age in the Ban Chiang sub-sample of burials with estimated age-at-death (Table 4.75). In the maxilla, moderate resorption is not noted until the 35-40 year age interval, and marked resorption only in the 45-50 year interval. In the mandible, moderate resorption is noted slightly earlier (25-30 years). The old age sample is too small for valid conclusions.

By combining these age intervals into larger categories (young adult 15-35 years), middle-aged (35-50 years) and old (50+ years) sex differences in the prevalence of resorption can be tested (Table 4.76). In young adults, there is only slightly more advanced resorption in male tooth sockets (2.6%) compared to females (1.2%). In middle-age, males have more advanced resorption than females, a difference which is statistically significant. The absence of observations of advanced resorption in the old-aged sample is likely related to small sample size.

Table 4.76. Statistical Analyses of Alveolar Resorption in Permanent Tooth Sockets By Sex and Age

Age Group Degree of Resorption	Male		Female		Statistic	
	A/O	%	A/O	%	Test	p
Young Adult Absent/slight	75/77	97.4	172/174	98.9	FET	0.588
Advanced	2/77	2.6	2/74	1.2		
Middle-Aged Absent/slight	244/305	80.0	152/172	88.4	χ^2**=5.468**	**0.019**
Advanced	61/305	20.0	20/172	11.6		
Old-aged Absent/slight	12/12	100.0	10/10	100.0		

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability), young 15-35 years, middle-age 35-50 years, old 50+ years. Thirteen young adult, 25 middle-aged, 3 old aged individuals. **Bold** indicates statistical significance.

Alveolar Resorption by Group

The prevalence of alveolar resorption in the Ban Chiang tooth sockets is greater in males than females, a difference partly explained by the skewed age distribution and the small sample size. Examining the prevalence of resorption by general age categories and group (Table 4.77) does not reveal any statistically significant differences in the distribution of advanced resorption, although the sample sizes within each group are small.

Table 4.77. Statistical Analyses of Alveolar Resorption in Permanent Tooth Sockets By Group and Age

Age Group Degree of Resorption	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	p
Young Adult Absent/slight	121/123	98.4	134/136	98.5	FET	1.000
Advanced	2/123	1.6	2/136	1.5		
Middle-Aged Absent/slight	238/287	82.9	158/190	83.2	χ^2=0.004	0.948
Advanced	49/287	17.1	32/190	16.8		
Old-aged Absent/slight	10/10	100.0	12/12	100.0		

Note: A=affected, O=observed, FET=Fisher's Exact Test, two-tailed probability. Thirteen young adult, 25 middle-aged, 3 old aged individuals. **Bold** indicates statistical significance (α=0.10).

Examining the prevalence of resorption by sex and group (Table 4.78) documents significant sex differences within each group. In both groups, male tooth sockets have more advanced resorption than females, a tendency noted in the overall sample. Male tooth sockets demonstrate a slight increase in advanced resorption (15.9% : 18.2%) in the Late Group, while female tooth sockets demonstrate a slight decrease (9.1% : 8.0%) in advanced resorption. Statistical testing finds these temporal changes are not statistically significant (male sockets χ^2=0.418, *df* 1, p=0.518; female sockets χ^2=0.159, *df* 1, p=0.690).

Table 4.78. Prevalence of Alveolar Resorption By Group and Sex in Adult (>15 years) Permanent Tooth Sockets from Ban Chiang

(# of Individuals) Jaw/Degree Affected/Observed		Early Group (EP I-IV)						Late Group (EP V- LP X)					
		Male (14)		Female (11)		Statistic		Male (13)		Female (18)		Statistic	
		A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla	absent/slight	123/154	79.9	69/79	87.3	χ^2=2.010	0.156	50/66	75.8	117/129	90.7	**χ^2=7.925**	**0.005**
	advanced	31/154	20.1	10/79	12.7			16/66	24.2	12/129	9.3		
Mandible	absent/slight	131/148	88.5	91/97	93.8	χ^2=1.936	0.164	94/110	85.5	113/121	93.4	**χ^2=3.896**	**0.048**
	advanced	17/148	11.5	6/97	6.2			16/110	14.5	8/121	6.6		
Total	absent/slight	254/302	84.1	160/176	90.9	**χ^2=4.438**	**0.035**	144/176	81.8	230/250	92.0	**χ^2=9.992**	**0.002**
	advanced	48/302	15.9	16/176	9.1			32/176	18.2	20/250	8.0		

Note: 56 individuals represented, Early Group 25, Late Group 31. **Bold** indicates statistical significance (α=0.10).

Combining the sample again using both sexes and all adults, Table 4.79, the prevalence of abscessing is not noted to change through time. The prevalence of advanced resorption is nearly identical in each jaw and in the combined tooth sample.

Table 4.79. Prevalence of Alveolar Resorption, By Group in Adult (>15 years) Permanent Teeth

Jaw Degree of resorption		Early Group		Late Group		Statistic	
		A	%	A	%	Test	Probability
Maxilla	Absent/slight	194	82.6	167	85.6	χ^2=0.754	0.385
	Advanced	41	17.4	28	14.4		
Mandible	Absent/slight	228	90.8	207	89.6	χ^2=0.206	0.650
	Advanced	23	9.2	24	10.4		
Total	Absent/slight	422	86.8	374	87.8	χ^2=0.189	0.663
	Advanced	64	13.2	52	12.2		

Note: A=affected. Includes 57 individuals: 27 males, 29 females, 1 ?sex. **Bold** indicates statistical significance (α=0.10).

Summary of Alveolar Resorption

Neither marked (2.3%) nor moderate (10.4%) degrees of alveolar resorption are common in the Ban Chiang adult tooth sockets. Slight resorption is noted only in slightly more than a quarter of the tooth sockets observed (28.0%, 255/912). While the age-at-death distribution of this sample is skewed toward young adult females, and middle-aged males, there is a statistically significant difference in the prevalence of resorption between males and females. Males have more advanced resorption in the maxilla, mandible, and the combined tooth sockets, differences which are maintained within both temporal groups at the site.

Moderate alveolar resorption is noted in the last half of the third decade of life in the mandible, and in the first half of the fourth decade in the maxilla. There are no statistical differences in the prevalence of advanced alveolar resorption over time at Ban Chiang.

Adult Calculus

Scoring calculus in the teeth from Ban Chiang was difficult for a number of reasons. Because the remains have been curated more than twenty years, examined by a variety of researchers for a multiplicity of reasons, handled, photographed, measured, etc. it is highly likely that some calculus has been lost from the tooth surfaces. In addition, the presence of mineralized deposits on the teeth, perhaps mimicking calculus, or obscuring calculus, also serves to inhibit accurate observations. In short, these data are presented with a full measure of caution. Scored on a none, slight, moderate and marked scale, calculus deposits in the Ban Chiang teeth never exceeded moderate degree (Table B.15). Ninety-three percent of the permanent teeth had observations of calculus (887/949), with 26.7% of moderate degree.

Table 4.80. Calculus Formation in Ban Chiang Subadult (<15 Years) Permanent Teeth

Sex A/O	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	4/8	4/4	2/2	4/4	14/18	4/8	4/4	2/2	4/4	14/18	28/36
Female	1/3	0/1			1/4	0/2	0/1		0/1	0/4	1/8
? Sex	1/1				1/1	1/1	4/4	2/2*	4/4†	11/11‡	12/12‡
Total	6/12	4/5	2/2	4/4	16/23	5/11	8/9	4/4*	8/9†	25/33‡	41/56‡

Note: 7 individual burials (3 males, 3 females, 1?sex) are represented. M=molar, P=premolar, C=canine, I=incisor, A=affected, O=observed. Observations are of slight calculus unless indicated:
* Includes one moderate observation. † includes four moderate observations. ‡ Includes five moderate observations.

There is little difference between the two jaws in the amount of calculus. Molars are most often affected with moderate calculus (36.4%), followed by the incisors (21.5%). In subadult permanent teeth (Table 4.80), calculus was noted on 89.1% of the teeth, including moderate calculus (8.9%) found in the lower anterior teeth of a child aged 10-12. These observations appear anomalous but may reflect the underscoring of calculus in the adult teeth.

Male teeth have more calculus, with slightly more severe degrees, than female teeth (Table 4.81). Collapsing the absent and slight categories for statistical testing finds no significant differences between the male and female teeth. In both sexes, the maxilla has more advanced calculus than the mandible. Overall, 29.3% of male teeth have advanced calculus, compared to 25.2% of female teeth.

Table 4.81. Prevalence of Calculus, By Sex, in Ban Chiang Adult (>15 years) Permanent Teeth

Jaw Degree of Calculus		Male		Female		Statistic*	
		A	%	A	%	Test	Probability
Maxilla	Absent	7/230	3.0	24/213	11.3		
	Slight	152/230	66.1	130/213	61.0		
	Moderate	71/230	30.9	59/213	27.7	χ^2=0.536	0.464
Mandible	Absent	1/255	0.4	29/228	12.7		
	Slight	183/255	71.8	147/228	64.5		
	Moderate	71/255	27.8	52/228	22.8	χ^2=1.608	0.205
Total Sockets	Absent	8/485	1.6	53/441	12.0		
	Slight	335/485	69.1	277/441	62.8		
	Moderate	142/485	29.3	111/441	25.2	χ^2=1.963	0.161

* The absent and slight categories are collapsed for statistical testing. Note: A=affected. Includes 62 individuals: 30 males, 32 females; 58 adults (>20 years), 4 adolescents.

Table 4.82. Summary of Calculus by Age in Ban Chiang Permanent Teeth (Individuals >15 years of age)

Sex/Degree Teeth Observed % Affected	Age Interval in Years (Number of Individuals)									Total (46)	
	15-20 (7)	20-25 (1)	25-30 (5)	30-35 (2)	35-40 (11)	40-45 (6)	45-50 (11)	50-55 (1)	55-60 (2)		
Male	2	0	66	19	119	62	117	15	0	400	
Absent	0.0		10.6	0.0	0.0	0.0	0.0	0.0		7	1.8
Slight	100.0		89.4	100.0	52.1	83.9	60.7	53.3		273	68.3
Moderate					47.9	16.1	39.3	46.7		120	30.0
Female	68	18	60	17	90	35	68	0	7	363	
Absent	35.3	0.0	0.0	0.0	0.0	0.0	0.0		42.9	27	7.4
Slight	64.7	77.8	70.0	82.4	54.4	77.1	76.5		28.6	244	67.2
Moderate		22.2	30.0	17.6	45.6	22.9	23.5		28.6	92	25.3
Total	93	18	126	36	209	97	185	15	7	786	
Absent	26.9	0.0	5.6	0.0	0.0	0.0	0.0	0.0	42.9	35	4.6
Slight	73.1	77.8	80.2	91.7	53.1	81.4	66.5	53.3	28.6	539	68.6
Moderate	0.0	22.2	14.3	8.3	46.9	18.6	33.5	46.7	28.6	212	27.0

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 22 males, 23 females, 1 ?sex.

The absence of significant sex differences in the prevalence of advanced calculus must be interpreted with consideration of the age structure of the respective populations (Table 4.82). This sub-sample of individuals with age estimated within a five year interval is small (N=46), and only trends should be suggested. There are more female teeth in the younger age intervals, and more male teeth in the middle-age intervals, a distribution which supports the findings of greater calculus in male teeth. Slight calculus is present in both sexes from early adulthood. In the male teeth, moderate calculus is noted by age 25-30 years, while in the female teeth it occurs by 20-25 years. There is a fairly predictable progression through the age intervals, with increasing observations of moderate calculus, except in the final age intervals, which, due to small sample sizes are debatable.

The sex differences in calculus prevalence observed in the total sample, are less pronounced when examined in the aged sub-sample (Table 4.83). In young adults, observations of advanced degree are seen exclusively in female teeth (15.3%), suggesting more severe calculus in female teeth at an earlier age. There is no difference in middle or old-aged teeth.

Table 4.83. Statistical Analyses of Alveolar Resorption in Permanent Tooth Sockets By Sex and Age

Age Group	Degree of Resorption	Male		Female		Statistic	
		A/O	%	A/O	%	Test	p
Young Adult	Absent/slight	87/87	100.0	138/163	85.7	**χ^2=14.83**	**0.000**
	Advanced	0/87	0.0	25/163	15.3		
Middle-aged	Absent/slight	185/298	62.1	128/193	66.3	χ^2=0.912	0.340
	Advanced	113/298	37.9	65/193	33.7		
Old-aged	Absent/slight	8/15	53.3	5/7	71.4	FET	0.648
	Advanced	7/15	46.7	2/7	28.6		

Note: A=affected, O=observed, FET=Fisher's Exact Test, two-tailed probability. Fourteen young adult, 28 middle-aged, 3 old aged individuals. **Bold** indicates statistical significance (α=0.10).

Temporal Analysis of Adult Calculus

Examination of the group sub-samples for sex differences in calculus prevalence is summarized in Table 4.84. In the Early Group at Ban Chiang, female teeth have more observations of advanced calculus than male teeth, with statistically significant differences in the maxilla and overall (38.6% : 27.9%). In the Late Group, however, male teeth have more calculus than female teeth in both jaws and overall (31.0% : 15.6%). These differences may be the result of differing age structures, since there are more young adult males in the Early Group, and more young adult females in the Late Group.

Advanced calculus prevalence increases in the Late Group in male teeth (27.9% : 31.0%), but the difference is not statistically significant (χ^2=0.535, df=1, p=0.465). In female teeth, calculus prevalence declines in the Late Group (38.6% : 15.6%), and is statistically significant (χ^2=30.176, df=1, p=0.000).

Table 4.84. Prevalence of Calculus By Group and Sex in Adult (>15 years) Permanent Tooth Sockets from Ban Chiang

(# of Individuals) Jaw/Degree Affected/Observed		Early Group (EP I-IV)						Late Group (EP V- LP X)					
		Male (14)		Female (13)		Statistic		Male (16)		Female (19)		Statistic	
		A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla	Absent/slight	106/141	75.2	50/89	56.2	**χ^2=9.023**	**0.003**	53/89	59.6	104/124	83.9	**χ^2=15.814**	**0.000**
	Advanced	35/141	24.8	39/89	43.8			36/89	40.4	20/124	16.1		
Mandible	Absent/slight	90/131	68.7	63/95	66.3	χ^2=0.143	0.705	94/124	75.8	113/133	85.0	**χ^2=3.433**	**0.064**
	Advanced	41/131	31.3	32/95	33.7			30/124	24.2	20/133	15.0		
Total	Absent/slight	196/272	72.1	113/184	61.4	**χ^2=5.694**	**0.017**	147/213	69.0	217/257	84.4	**χ^2=15.859**	**0.000**
	Advanced	76/272	27.9	71/184	38.6			66/213	31.0	40/257	15.6		

Note: 62 individuals represented, Early Group 27, Late Group 35. **Bold** indicates statistical significance (α=0.10).

Combining the sexes (Table 4.85), and controlling for general age categories (young adult, middle-age, old), advanced observations are greater in the Early Group (32.8% : 20.3%). There is a slight increase in advanced calculus in the young adult category (8.4% : 10.0%), and a larger increase in the old category (28.6% : 46.7%). However, the sample of middle-aged individuals shows a statistically significant decline in advanced calculus (46.1% : 24.6%), which is the trend of the whole sample. As in other analyses the very small sample of old aged teeth at Ban Chiang is problematic.

Table 4.85. Prevalence of Calculus, By Group and Age in Adult (>15 years) Permanent Teeth

Age Category Degree of calculus		Early Group		Late Group		Statistic	
		A	%	A	%	Test	Probability
Young adult	Absent/slight	131	91.6	117	90.0	χ^2=0.212	0.645
	Advanced	12	8.4	13	10.0		
Middle-age	Absent/slight	144	53.9	169	75.4	**χ^2=24.396**	**0.000**
	Advanced	123	46.1	55	24.6		
Old	Absent/slight	5	71.4	8	53.3	FET	0.648
	Advanced	2	28.6	7	46.7		
Total	Absent/slight	280	67.2	294	79.7	**χ^2=15.600**	**0.000**
	Advanced	137	32.8	75	20.3		

Note: A=affected, FET= Fisher's Exact Test (2-tailed probability). Uses only individuals with age-interval estimates: 46 individuals: 22 males, 23 females. Young adult is aged 15-35, middle-aged 35-50, old aged 50-60 years. **Bold** indicates statistical significance (α=0.10).

Summary of Calculus

There are no observations of marked calculus in the Ban Chiang adult (>15 years) teeth. Calculus of any degree is noted in 93.5% of the teeth observed, with 26.7% teeth affected with moderate or marked deposits. Calculus is more common and more severe in male teeth than female teeth, with significant differences in the maxillary, mandibular and all teeth combined. Slight calculus is noted in teeth from early adulthood, with the first observations of moderate degree occur in female teeth in the 20-25 year age interval. By age 35-40, more than 40% of both male and female teeth are affected by moderate dental calculus.

In the Early Group at Ban Chiang, female teeth have more advanced calculus than male teeth, while in the Late Group there is significantly more advanced calculus in the male teeth. Over time, calculus in the male teeth increases slightly, while calculus in the female teeth declines by nearly half. Combining the sexes, and controlling for age, there is a significant decline in the prevalence of advanced calculus formation in the Late Group.

Adult Dental Attrition

General observations of dental attrition in the Ban Chiang permanent teeth are discussed in this section. Levels of attrition include none (zero to slight facet polishing), wear without exposure of dentin (enamel), dentin exposure (dentin), pulp chamber exposure (pulp), and wear to the roots (roots). Advanced wear includes both pulp exposure and wear to the roots. It is evident that using this system of scoring ignores the gradual accumulative nature of dental attrition, so observations will tend to clump. However, this general overview is adequate for the purposes of this analysis.

In the subadult (<15 years) permanent teeth at Ban Chiang (Table 4.86), dentin exposure is noted in four teeth (5.3%, 4/75). These observations are recorded in the central incisors of both jaws in a single individual (Burial BC-25, a 12-15 year old male). Wear is slightly more advanced in the maxilla than the mandible. The majority of the teeth have enamel wear (43/75, 57.3%). Since the first permanent teeth to erupt are typically the first molars, followed by the central and lateral incisors, it is not surprising to see wear at these levels in these teeth by adolescence.

Table 4.86. Dental Attrition in the Subadult (<15 Years) Permanent Teeth From Ban Chiang

Tooth Class/Degree Affected/Observed		Maxilla				Mandible			
		Male	Female	?Sex	Total	Male	Female	?Sex	Total
Molars	None	4/8	2/3	3/4	9/15	3/7	2/3	2/4	7/14
	Enamel	4/8	1/3	1/4	6/15	4/7	1/3	2/4	7/14
Premolars	None	0/4		0/1	0/5	0/4		2/6	2/10
	Enamel	4/4		1/1	5/5	4/4		4/6	8/10
Canines	None	0/2		1/1	1/3	0/2		0/2	0/4
	Enamel	2/2		0/1	2/3	2/2		2/2	4/4
Incisors	None	0/4		1/4	1/8	4/8	1/1	3/7	8/16
	Enamel	2/4		3/4	5/8	2/8	0/1	4/7	6/16
	Dentin	2/4		0/4	2/8	2/8	0/1	0/7	2/16
Total	None	4/18	2/3	5/10	11/31	7/21	3/4	7/19	17/44
	Enamel	12/18	1/3	5/10	18/31	12/21	1/4	12/19	25/44
	Dentin	2/18	0/3	0/10	2/31	2/21	0/4	0/19	2/44

Note: Seven individual burials represented: 3 males, 2 females, 2 ?sex. Two individuals are aged 5-7 years, three individuals 6-8 years, one aged 11-13 and one aged 13-15 years.

Summary of the prevalence of dental attrition in the adult (>15 years) permanent teeth from Ban Chiang is presented in Table B.16. The majority of the teeth exhibit enamel wear (41.5%) or dentin exposure (41.9%). No wear (1.2%) is recorded only in the third molars of both jaws, and a few second molars in the maxilla. Advanced wear is present in 15.2% (166/1095) of the teeth, and is only slightly more common in the maxilla (16.0%, 84/527) than the mandible (15.0%, 85/568). Dental attrition to the pulp is greatest in the canines (19.1%), followed by the incisors (18.2%) and premolars (14.4%), with the highest occurrence in the maxillary teeth. Wear down to the roots is also more common in the canines (2.0%), followed closely by the premolars (1.5%) and incisors (1.4%). Male teeth have a greater frequency of advanced wear (21.2%, 118/558) than female teeth (10.0%, 51/512), a difference which is large in the maxilla (23.7% : 8.5%), and less in the mandible (18.8% : 11.4%)

Examining the sex differences in attrition in the Ban Chiang teeth more closely (Table 4.87), the greater prevalence of advanced attrition in male teeth is primarily evident in the maxillary premolars and anterior teeth, and the mandibular molars. This is suggestive of the possibility that males used their anterior maxillary teeth as tools more than females.

Since dental attrition is accumulative, the distribution of wear must be examined according to the age distribution of the teeth. Table 4.88 summarizes the prevalence of attrition in the sub-sample of Ban Chiang adults with estimated age intervals (n=48). This is a loss of 16 individuals and 166 teeth from the complete sample. Again, the caveats associated with skeletal aging are in force in this discussion. The male tooth sample is deficient in both

Table 4.87. Prevalence of Advanced Dental Attrition, By Sex, in Adult (>15 years) Permanent Teeth

Jaw/Tooth Class Advanced attrition		Male		Female		Statistic	
		A/O	%	A/0	%	Test	Probability
Maxilla	Molars	9/97	9.3	5/87	5.8	χ^2=0.814	0.367
	Premolars	18/74	24.3	6/79	7.6	**χ^2=8.086**	**0.004**
	Canines	12/33	36.4	5/35	14.3	**χ^2=4.416**	**0.036**
	Incisors	24/62	38.7	5/49	10.2	**χ^2=11.523**	**0.001**
Total		63/266	23.7	21/250	8.4	**χ^2=22.090**	**0.000**
Mandible	Molars	20/110	18.2	8/96	8.3	**χ^2=4.233**	**0.040**
	Premolars	16/91	17.6	12/74	16.2	χ^2=0.054	0.816
	Canines	11/45	24.4	4/35	11.4	χ^2=2.189	0.139
	Incisors	8/46	17.4	6/57	10.5	χ^2=1.021	0.312
Total		55/292	18.8	30/262	11.5	**χ^2=5.799**	**0.016**
All Teeth		118/558	21.1	51/512	10.0	**χ^2=25.120**	**0.000**

Note: A=affected, O=observed. Includes 56 individuals: 27 males, 29 females; 53 adults (>20 years), 3 adolescents. **Bold** indicates statistical significance (α=0.10).

the older and younger age intervals. In both sexes, the first appearance of dental attrition exposing the pulp/roots occurs in the 35-40 year age interval, in males 18.2% of the tooth sample at that age is affected, while in females, only 4.7% of the teeth at this age have advanced wear. This suggests that advanced wear occurs slightly later in the female teeth (40-45 years). While enamel wear persists through all the age intervals in both sexes, in male teeth the predominant attrition pattern is dentin exposure (51.5%, 230/447). In females, however, the predominant attrition pattern is enamel wear (54.4%, 239/432), again, supporting the conclusion that male teeth have both more attrition, and more advanced attrition, over the same age intervals. There are no apparent differences between the jaws in the age-dependent prevalence of attrition.

Table 4.88. Summary of Dental Attrition By Age, Jaw and Sex in Ban Chiang Permanent Teeth (Individuals >15 years of age)

Sex/Jaw Teeth A/O		Age Interval in Years									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Male	Individuals	1	0	3	1	6	4	7	1	0	23
	None/enamel	2/2		43/69	17/23	35/121	11/64	11/152	1/16		120/447
	Dentin			26/69	6/23	64/121	49/64	85/152	0/16		230/447
	Pulp					17/121	4/64	55/152	15/16		91/447
	Roots					5/121		1/152			6/447
Female	Individuals	5	1	2	1	6	3	4	0	2	24
	None/enamel	80/89	16/22	51/59	22/30	51/107	10/36	8/69		1/20	239/432
	Dentin	9/89	6/22	8/59	8/30	51/107	12/36	43/69		15/20	152/432
	Pulp					4/107	14/36	14/69		4/20	36/432
	Roots					1/107		4/69			5/432
Maxilla	None/enamel	57/58	7/8	43/67	15/23	45/121	9/43	13/107	1/7	1/9	191/443
	Dentin	1/58	1/8	24/67	8/23	56/121	26/43	67/107	0/7	8/9	191/443
	Advanced					20/121	8/43	27/107	6/7		61/443
Mandible	None/enamel	50/58	9/14	51/61	24/30	41/107	12/57	6/114	0/9	0/11	193/461
	Dentin	8/58	5/14	10/61	6/30	59/107	35/57	61/114	0/9	7/11	191/461
	Advanced					7/107	10/57	47/114	9/9	4/11	77/461
Total	Individuals	7	1	5	2	12	7	11	1	2	48
	None/enamel	107/116	16/22	94/128	39/53	86/228	21/100	19/221	1/16	1/20	384/904
	Dentin	9/116	6/22	34/128	14/53	115/228	61/100	128/221	0/16	15/20	382/904
	Advanced					27/228	18/100	74/221	15/16	4/20	138/904

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 23 males, 24 females, one ?sex.

Temporal Changes in Attrition

Examining the group sub-samples for sex differences in the prevalence of advanced dental attrition (Table 4.89), shows advanced attrition in the Early Group female mandibular incisors (33.3%), and all mandibular teeth (22.8%), is greater than that in the comparable male teeth (4.5% and 12.5% respectively). In the Late Group, the male teeth have more advanced attrition in every tooth class, especially the maxillary incisors (81.0%, 17/21). The total male maxillary teeth (41.5%) are more often affected than the male mandibular teeth (31.9%), and the premolars and anterior teeth are most commonly affected in both jaws.

While there is an apparent dramatic increase in the prevalence of advanced attrition in the male teeth in the Late Group (12.2% : 31.9%), and a decrease in the prevalence of advanced attrition in the female teeth (18.2% : 4.8%), these changes must be examined relative to the age structure of the two samples (Table 4.90). The Early Group dental sample is lacking old males, while the Late Group dental sample is lacking old females. In both groups, there are no observations of advanced wear in young adult individuals. In the middle-age adults, there is a significant increase in advanced tooth wear in male teeth (17.6% : 34.9%), and a significant decrease in advanced wear in female teeth (23.9% : 12.5%).

When the sexes are combined, the increase in advanced dental wear is dramatic in the old-aged sample (20.0% : 93.8%), but since these samples are so small, as well as sex specific within each group, this shift is unlikely to represent a real phenomenon. In the middle-age sample, the male increase in advanced attrition, and the female decline, result in no net change in advanced dental attrition over time.

Table 4.89. Advanced Dental Attrition, By Sex and Group in Adult and Adolescent (>15 years) Permanent Teeth from Ban Chiang

(# of Individuals) Jaw/Tooth Class Affected/Observed	Early Group (EP I - IV)						Late Group (MP V - LP X)					
	Male (14)		Female (13)		Statistic		Male (17)		Female (20)		Statistic	
	A/O	%	A/O	%	Test	p	A/O	%	A/O	%	Test	p
Maxilla Molars	2/55	3.6	4/30	13.3	FET	0.179	**7/42**	**16.7**	**1/57**	**1.8**	**FET**	**0.009**
Premolars	6/45	13.3	4/34	11.8	FET	1.000	**12/29**	**41.4**	**2/45**	**4.4**	**χ^2=15.68**	**0.000**
Canines	4/19	21.1	3/16	18.8	FET	1.000	**8/14**	**57.1**	**2/19**	**10.5**	**FET**	**0.007**
Incisors	7/41	17.1	2/17	11.8	FET	1.000	**17/21**	**81.0**	**3/32**	**9.4**	**χ^2=27.65**	**0.000**
Maxillary Teeth	19/160	11.9	13/97	13.4	χ^2=0.129	0.719	**44/106**	**41.5**	**8/153**	**5.2**	**χ^2=51.37**	**0.000**
Mandible Molars	7/55	12.7	6/38	15.8	χ^2=0.175	0.675	**13/55**	**23.6**	**2/58**	**3.4**	**χ^2=9.994**	**0.002**
Premolars	6/45	13.3	8/32	25.0	χ^2=1.711	0.191	10/46	21.7	4/42	9.5	χ^2=2.449	0.118
Canines	4/22	18.2	4/16	25.0	FET	0.698	**7/23**	**30.4**	**0/19**	**0.0**	**FET**	**0.011**
Incisors	**1/22**	**4.5**	**5/15**	**33.3**	**FET**	**0.031**	**7/24**	**29.2**	**1/42**	**2.4**	**FET**	**0.003**
Mandibular Teeth	**18/144**	**12.5**	**23/101**	**22.8**	**χ^2=4.495**	**0.034**	**37/148**	**25.0**	**7/161**	**4.3**	**χ^2=26.93**	**0.000**
Total Attrition	**37/304**	**12.2**	**36/198**	**18.2**	**χ^2=3.486**	**0.062**	**81/254**	**31.9**	**15/314**	**4.8**	**χ^2=73.49**	**0.000**

Note: Advanced attrition includes wear exposing the pulp and to the roots. A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10).

Table 4.90. Prevalence of Advanced Attrition by Sex, Age and Group in Ban Chiang Permanent Teeth

Sex Age Category		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	*p*
Male	Young	0/69	0.0	0/25	0.0		
	Middle-aged	**36/205**	**17.6**	**46/132**	**34.9**	**χ^2=13.034**	**0.000**
	Old			15/16	93.8		
Female	Young	0/53	0.0	0/147	0.0		
	Middle-aged	**22/92**	**23.9**	**15/120**	**12.5**	**$\chi^2$4.708**	**0.030**
	Old	4/20	20.0				
Total	Young	0/147	0.0	0/172	0.0		
	Middle-aged	58/297	19.5	61/252	24.2	χ^2=1.7570	0.185
	Old	4/20	20.0	15/16	93.8	χ^2=19.399	0.000

Note: Only individuals with age estimated from indicators other than dental wear are included here: 69 individuals: 34 males, 34 females, 1 ?sex. Young=15-35 years, middle=35-50 years, old=50-60+ years. Early Group includes EPI-EPIV, Late Group includes EPV-LPX. A=affected, O=observed. **Bold** indicates statistical significance (α=0.10).

Summary of Dental Attrition

Attritive wear of the permanent teeth at Ban Chiang reaches the dentin in the incisors (4/24, 16.7%) before the age of 15 years. In the total adult permanent tooth sample, dental attrition affects the enamel (41.5%), dentin (41.9%), pulp (14.0%) and roots (1.2%). Advanced wear (pulp exposure and wear to the roots) occurs in the premolars, canines and incisors; and is more common in male teeth (21.2%) than female teeth (10.0%).

Advanced wear is first observed in males aged 35-40 (18.2%), while in female teeth substantial advanced wear (26.0%) is not noted until age 45-50 years. This earlier onset in males, coupled with the greater prevalence of advanced wear in male teeth suggests that males were using their anterior dentition for other purposes than simply eating.

There are sex differences in the prevalence of advanced wear in the Ban Chiang Late Group sub-sample. In the Early Group the prevalence of advanced wear is approximately equal in male and female teeth (12.2% : 18.2%), but in the Late Group, male teeth have significantly more advanced attrition (31.9%) than female teeth (4.8%). These differences may be attributable to the absence of old males in the Early Group, and the absence of old females in the Late Group. Controlling for age, the prevalence of advanced attrition in middle-aged males significantly increases in the Late Group (17.6% : 34.9%), and in middle-aged females there is a significant decline in advanced wear (23.9% : 12.5%). The net effect is no significant difference in dental attrition over time.

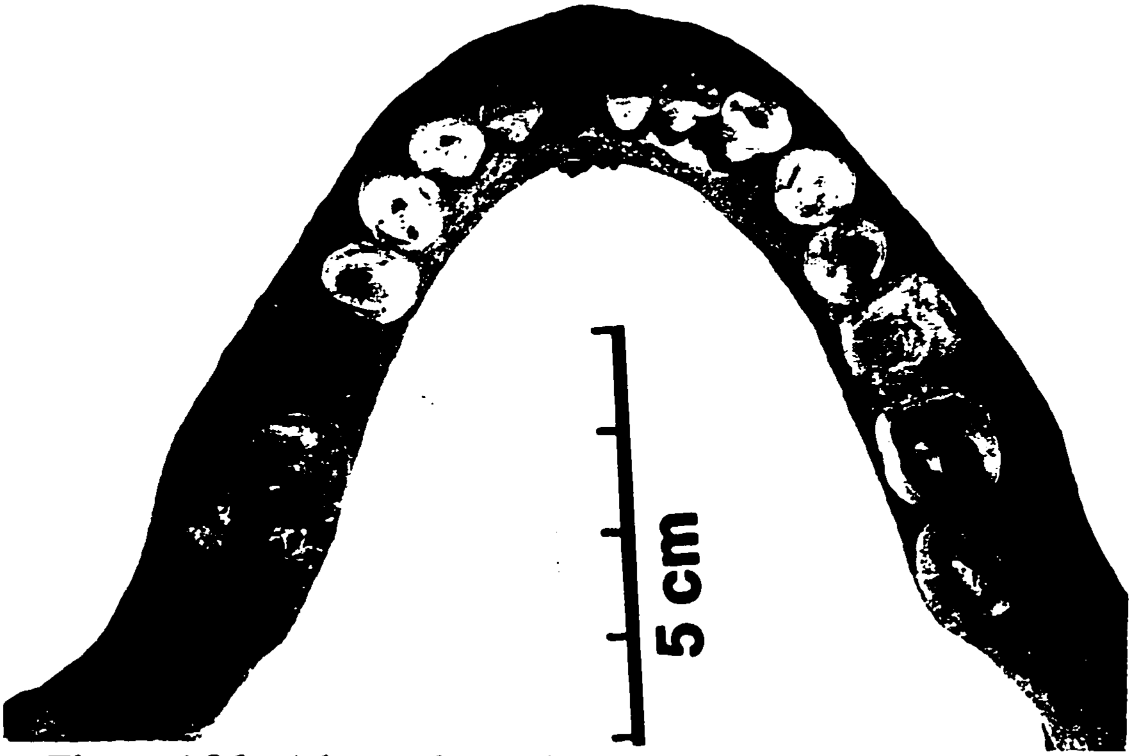


Figure 4.26. Advanced Attrition of the Mandibular Molars
Note the complete destruction of the left first molar crown, with apical abscessing.

Summary of Permanent Dental Pathologies

In this section, the seven dental pathologies examined in this analysis will be discussed as a whole and relative to change over time, in an attempt to visualize the complete oral health of the Ban Chiang adults. First, a contrast between the two sexes in the adult permanent tooth sample from Ban Chiang (Figure 4.27). Premortem tooth loss is slightly more common in male teeth (7.4%) than female teeth (6.2%), as are caries (8.1% : 6.0%, respectively), but the differences are not statistically significant. However, there is a significant difference in caries origin by sex; caries are more often on the occlusal surface in female teeth, and on other tooth surfaces in males. Abscessing of the tooth sockets, attributed to dental wear and exposure of the pulp chamber, and found in older aged individuals at Ban Chiang, is statistically more common in male sockets (7.2%) than female tooth sockets (4.8%). This is a consistent pattern in males, since abscessing may be caused by caries, and results in premortem tooth loss.

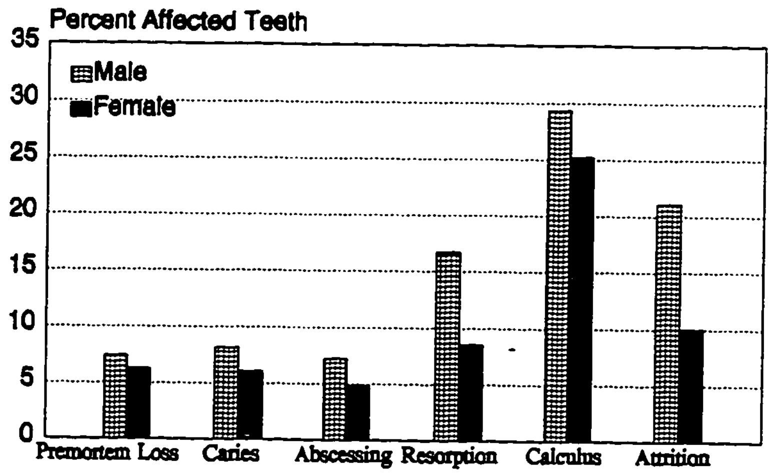


Figure 4.27. Ban Chiang Permanent Tooth Pathology

Alveolar resorption of any degree is noted in 51.3% of male tooth sockets, and 29.3% of female tooth sockets, while advanced resorption is present in 16.7% and 8.5% of the sockets respectively (shown in Figure 4.27). Although the older-aged sample is small, when age is controlled, male tooth sockets have more advanced resorption. Dental calculus of any degree is common in the Ban Chiang permanent teeth (93.0%, 887/949). Advanced calculus formation is noted at a younger age (20-25 years) in females, but by age 35-40 years more than 40% of both male and female teeth are affected. There are no significant sex differences in advanced calculus. Dental attrition reaches the dentin in the incisors of both jaws by late adolescence, with pulp exposure by age 35-40 years in both males and females. Advanced dental attrition (pulp exposure and wear to the roots) is noted in 15.2% of the adult teeth at Ban Chiang, typically occurring in the maxillary canines, incisors and premolars. Male teeth (21.2%) have a statistically greater prevalence of advanced wear than female teeth (10.0%).

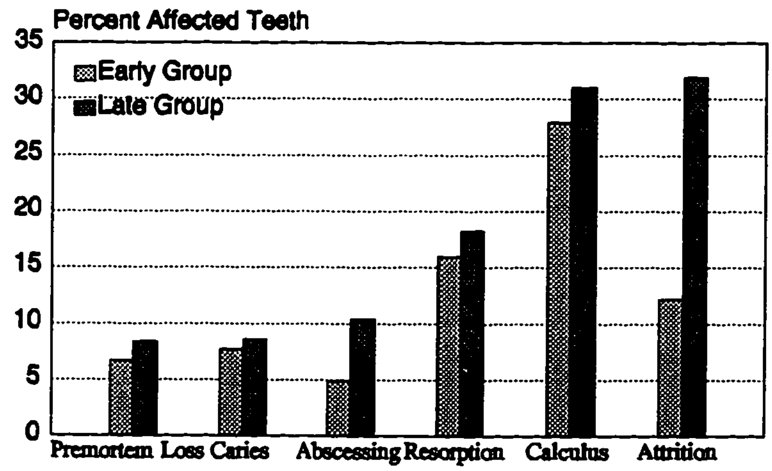


Figure 4.28. Temporal Trends in Male Dental Pathologies

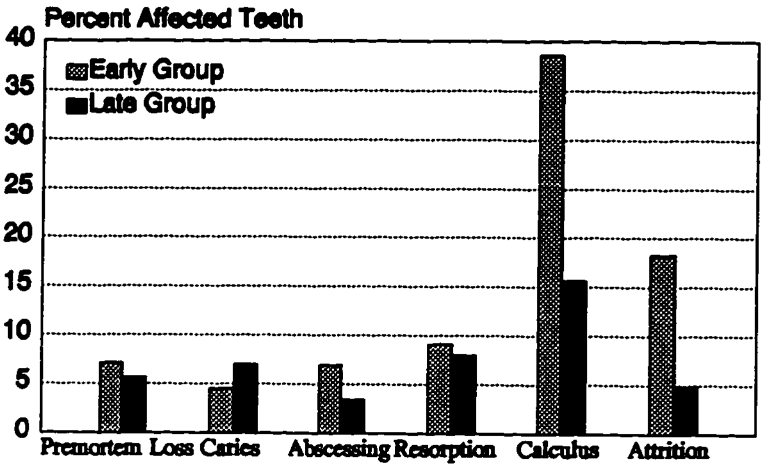


Figure 4.29. Temporal Trends in Female Dental Pathologies

Ban Chiang male dental pathologies all increase over time (Figure 4.28). The increases in premortem tooth loss (6.7% : 8.4%) and caries are not statistically significant, but reflect an increase in loss of the maxillary teeth, and a shift toward more occlusal caries in the Late Group. There is a significant increase in abscessing in the male sockets (4.9% : 10.4%), attributable to an increase in abscessing of the maxillary tooth sockets. The increases in advanced alveolar resorption and advanced calculus are not statistically significant. The huge increase in advanced attrition in male teeth (18.2% : 31.9%) in the Late Group likely reflects the absence of older aged individuals in the Early Group, but controlling for age supports a significant increase in Late Group middle-aged males.

Examining the temporal trend in Ban Chiang female dental pathologies (Figure 4.29) shows a decline in six of the seven pathologies examined. There is a significant increase only in caries frequency (4.5% : 7.4%), which can be attributed to an increase in caries of the molars and mandibular canines.

Although the decline in female premortem tooth loss in the Late Group (7.1% : 5.6%) is not statistically significant, there is a significant decline in maxillary tooth loss. The significant decrease in abscessing in the female tooth sockets (6.9% : 3.4%) may be related to the small size of the Late Group sample. There is no significant change in the occurrence of advanced alveolar resorption, but the change in advanced calculus is dramatic (38.6% : 15.6%). This decline, like the decrease in abscessing, may reflect small sample error. Finally, advanced dental attrition also declines in Late Group female teeth (18.2% : 4.8%), a change present in controlled-age analysis.

OSTEOARTHRITIS

Appendicular Osteoarthritis

The articular surfaces of the appendicular skeletons of Ban Chiang adults (>15 years) were examined for evidence of osteoarthritis, which included systematic scoring of lipping, porosis or a combination of the two, and textual descriptions of eburnation and ossific nodules. The results are summarized by functional unit (i.e. shoulder, elbow, etc.) in Table B.17. Osteoarthritis was observed in slightly more than half of all articular surfaces examined (2154/4153, 51.9%), with articular lipping as the most common change (2071/2154, 96.1%), and fewer observations of porosis (53/2154, 2.5%) and a combination of lipping and porosis (30/2154, 1.4%).

In the upper limb, 47.6% of the articular surfaces were affected (933/1961), with the articular surfaces of the elbow more commonly affected that the other functional units. Slightly more than four percent of the affected articular surfaces are noted to have advanced changes (moderate or marked), including one marked observation in a hand bone.

Osteoarthritis is slightly more common in the lower limb, affecting 55.7% of the articular surfaces observed (1221/2192). Again, articular lipping is the most common change (97.8%, 1194/1221), with few observations of lipping and porosis in combination (1.4%, 17/1221), and rare porosis (0.8%, 10/1221). Advanced osteoarthritis is noted in 6.0% (73/1221) of the affected surfaces, with the majority of these in the pelvis and foot [See Figures 4.30, 4.31].

Table 4.91. Prevalence of Appendicular Osteoarthritis, By Sex, in Ban Chiang Adults

Functional Unit Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	χ^2 Value	Probability
Upper Limb R shoulder	45/79	57.0	19/57	33.3	**7.420**	**0.006‡**
L shoulder	42/68	61.8	13/44	29.5	**1.096**	**0.001**
R elbow	74/108	68.5	28/65	43.1	**10.855**	**0.001**
L elbow	53/85	62.4	30/67	44.8	**4.670**	**0.031**
R wrist	40/58	69.0	11/40	27.5	**16.309**	**0.000**
L wrist	38/58	65.5	11/34	32.4	**9.470**	**0.002**
R hand	218/374	58.3	67/264	25.4	**67.816**	**0.000‡**
L hand	177/350	50.6	67/210	31.9	**18.601**	**0.000**
Lower Limb R pelvis	47/60	78.3	30/54	55.6	**6.726**	**0.009**
L pelvis	48/64	75.0	19/43	44.2	**10.433**	**0.001**
R knee	45/117	38.5	30/95	31.6	1.086	0.297‡
L knee	58/120	48.3	29/95	30.5	**6.979**	**0.008**
R ankle	43/53	81.1	18/41	43.9	**14.064**	**0.000**
L ankle	38/53	71.7	18/38	47.4	**5.535**	**0.019**
R foot	279/397	70.3	125/297	42.1	**55.501**	**0.000‡**
L foot	276/385	71.7	118/280	42.1	**56.608**	**0.000**

Note: All types and degrees of osteoarthritis, A=affected, O=observed, R=right, L=left. Includes 75 individuals: 39 males, 36 females. ‡ Indicates statistically greater prevalence of advanced osteoarthritis (vs none/slight) in males.

Osteoarthritis (any kind or degree) is more common in male articular surfaces (62.6%, 1521/2429) than in female ones (36.1%, 633/1724). A difference which is statistically significant in every functional unit examined, except the right knee (Table 4.91). When advanced observations are contrasted to none/slight observations, a statistically greater prevalence of advanced observations are found in the male right shoulder, right hand, right knee and right foot surfaces, than in the female articular surfaces. Although a trend toward greater prevalence of osteoarthritis in the right articular surfaces compared to the left might be expected as a result of handedness, there are no obvious side differences in either male or female articular surfaces.

Comparing the age distribution of osteoarthritis in male and female articular surfaces (Table 4.92) suggests slight articular changes begin to occur in early adulthood in both sexes, but the timing of advanced changes is different. In males, the articular surfaces of the foot exhibit advanced arthritis by the age of 25-30 years, followed by the shoulder, hand, and knee at 35-40 years, and at age 40-45 years, the elbow and pelvis. In females, initial advanced observations are noted in the pelvis, foot and shoulder (35-40 years), followed by the hand (40-45 years), and knee (45-50 years). No advanced observations are noted in the articular surfaces of the ankle in either sex.

Table 4.92. Summary of Appendicular Osteoarthritis, By Age and Sex, in Ban Chiang Adults

Sex/Functional Unit Articular Surfaces A/O		Age Interval (in years)									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
UPPER LIMB											
Male	Shoulder			0/17	2/7	**21/38**	11/16	37/51	6/6		77/135
	Elbow			9/22	0/2	24/45	**24/32**	48/64	6/6		111/171
	Wrist			3/14		13/17	14/20	37/51	4/6		71/108
	Hand			13/70	1/16	**39/109**	92/132	192/308	44/46		381/681
Female	Shoulder	1/12	0/3	5/24	1/9	**3/13**	8/11	14/25			32/97
	Elbow	4/13	0/2	10/32	0/9	13/30	6/6	19/27		2/2	54/121
	Wrist	0/6	0/3	0/16	0/7	5/15	3/4	4/10		**4/6**	16/67
	Hand	6/78	0/22	26/113	0/42	33/91	**14/16**	27/64		17/24	123/450
LOWER LIMB											
Males	Pelvis			7/16	1/3	18/27	**14/15**	52/56			92/117
	Knee			2/33	3/8	**15/53**	15/27	44/89	11/11		90/221
	Ankle			7/10	3/3	8/18	18/20	24/30	1/1		61/82
	Foot			**26/95**		119/161	112/125	195/251	34/35		486/667
Females	Pelvis	3/18	0/8	8/24	4/5	**9/16**	4/4	16/17		3/3	47/95
	Knee	0/20	0/20	2/31	1/14	15/31	12/16	**11/19**		6/8	47/159
	Ankle	3/11	0/4	4/17	2/6	5/8	4/5	5/9		4/4	27/64
	Foot	21/84	1/25	13/111	12/53	**30/44**	29/47	52/73		39/55	197/492

Note: All types and degrees of osteoarthritis, A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 27 males, 25 females. Numbers in **bold** reflect the first occurrence of an observation of advanced osteoarthritis.

Temporal Change in Appendicular Osteoarthritis

Comparing the prevalence of appendicular osteoarthritis (all types and degrees) at Ban Chiang over time, demonstrates very few statistically significant differences (Table 4.93). The absolute frequencies of osteoarthritis in each group are very closely matched, not suggesting any major distinctions between the two groups. The two statistically significant functional units exhibit opposite results: Osteoarthritis of the right pelvis is greater in the Early Group, and osteoarthritis of the right knee is greater in the Late Group. Examining the advanced arthritis (vs none/slight) also gives enigmatic results. In the right hand, more advanced arthritis is found in the Late Group, while in the left hand and left pelvis, more advanced observations are found in the Early Group.

Since there were significant sex differences in the prevalence of osteoarthritis in the complete sample of Ban Chiang adults, there may be changes over time which are sex specific (Table 4.94). In the male articular surfaces, there is a statistically greater prevalence of osteoarthritis in the Late Group at Ban Chiang in every functional unit except the pelvis. In the female sample, there is a decline in the prevalence of osteoarthritis over time in every functional unit. This may suggest one of two things, either there are more older males in the Late Group sample, or males were doing increased manual labor or repetitive labor contributing to more osteoarthritis. While these differences are perhaps suggestive of changes in activity levels or patterns, they must be evaluated relative to age-at-death before solid conclusions may be made.

Table 4.93. Prevalence of Appendicular Osteoarthritis, By Side and Group, in Ban Chiang Adults

Functional Unit Osteoarthritis Present		Early		Late		Statistic	
		A/O	%	A/0	%	χ^2 Value	Probability
Upper Limb	R shoulder	23/56	41.1	39/75	52.0	1.536	0.215
	L shoulder	25/49	51.0	28/61	45.9	0.285	0.593
	R elbow	48/74	64.9	54/99	54.5	1.864	0.172
	L elbow	34/62	54.8	49/90	54.4	0.002	0.962
	R wrist	24/46	52.2	27/52	51.9	0.001	0.980
	L wrist	24/46	52.2	25/46	54.3	0.044	0.834
	R hand	125/263	47.5	160/375	42.7	1.478	0.224‡
	L hand	109/231	47.2	133/327	40.7	2.338	0.126†
Lower Limb	R pelvis	**40/53**	**75.5**	**37/61**	**60.7**	**2.840**	**0.092**
	L pelvis	34/48	70.8	33/59	55.9	2.511	0.113†
	R knee	**27/94**	**28.7**	**48/118**	**40.7**	**3.271**	**0.071**
	L knee	41/91	45.1	46/124	37.1	1.380	0.240
	R ankle	30/43	69.8	31/51	60.8	0.826	0.363
	L ankle	24/39	61.5	32/52	61.5	0.000	1.000
	R foot	176/299	58.9	228/395	57.7	0.091	0.763
	L foot	190/313	60.7	204/352	58.0	0.518	0.472

Note: Osteoarthritis of any type and degree. A=affected, O=observed, R=right, L=left. Includes 74 individuals: 39 males, 35 females. † There is a statistically greater prevalence of advanced osteoarthritis in the Early Group. ‡ There is a statistically greater prevalence of advanced osteoarthritis in the Late Group.

Table 4.94. Appendicular Osteoarthritis, By Sex and Group, in Ban Chiang Adults

Functional Unit Osteoarthritis Present Affected/Observed		Male (N=39)						Female (N=35)					
		Early (n=15)		Late (n=24)		Statistic		Early (n=10)		Late (n=25)		Statistic	
		A/O	%	A/O	%	χ^2	p	A/O	%	A/O	%	χ^2	p
Upper Limb	Shoulder	38/78	48.7	49/69	71.0	**7.535**	**0.006**	10/27	37.0	18/67	26.9	0.952	0.329
	Elbow	59/100	59.0	68/93	73.1	**4.268**	**0.039**	23/36	63.9	35/96	36.5	**7.998**	**0.005**
	Wrist	38/65	58.5	40/51	78.4	**5.174**	**0.023**	10/27	37.0	12/47	25.5	1.087	0.297
	Hand	183/360	50.8	212/364	58.2	**4.007**	**0.045**	51/134	38.1	81/336	24.0	**9.464**	**0.002**
Lower Limb	Pelvis	56/74	75.7	39/50	78.0	0.090	0.764	18/27	66.7	31/70	44.3	**3.904**	**0.048**
	Knee	41/122	33.6	62/115	53.9	**9.934**	**0.002**	27/63	42.9	32/127	25.2	**6.134**	**0.013**
	Ankle	39/56	69.6	42/50	84.0	**3.021**	**0.082**	15/26	57.7	21/53	39.6	2.296	0.130
	Foot	269/413	65.1	286/369	77.5	**14.483**	**0.000**	97/199	48.7	146/378	38.6	**5.476**	**0.019**

Note: Osteoarthritis of all kinds and degrees, A=affected, O=observed. Includes 39 males, 35 females. **Bold** indicates statistical significance (α=0.10).

To address the problems of age distribution on the prevalence of osteoarthritis, age can be controlled in a very general sense. With all of the caveats on age-at-death estimation discussed above, those individuals with age interval estimates are collapsed into the general categories of young adult, middle-aged, and old adult (Table 4.95). Readily apparent from this table is the relatively low prevalence of osteoarthritis in the young adults, and the relatively high prevalence in the old adults. It is also apparent that both of the samples are skewed toward middle-aged males, and the total absence of old-aged males in the Early Group, and old-aged females in the Late Group, provides a ready explanation for the increase in osteoarthritis in the Late Group in males, and the decrease in females.

Table 4.95. Appendicular Osteoarthritis, By Group and Sex, Controlling for Age

Sex/Age Category Articular Surfaces		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	*p*
Upper Limb							
Male	Young	25/123	20.3	3/25	12.0	FET	0.900
	Middle	287/465	61.7	265/412	64.3	χ^2=0.633	0.426
	Old			58/61	95.1		
Female	Young	28/101	27.7	25/282	8.8	**χ^2=22.18**	**0.000**
	Middle	35/80	43.8	108/221	48.9	χ^2=0.617	0.432
	Old	24/32	75.0				
Lower Limb							
Male	Young	42/154	27.3	7/14	50.0	**FET**	**0.073**
	Middle	350/488	71.7	284/384	74.0	χ^2=0.542	0.462
	Old			46/47	97.9		
Female	Young	15/108	13.9	59/343	17.2	χ^2=0.657	0.418
	Middle	79/126	62.7	113/163	69.3	χ^2=1.400	0.237
	Old	52/70	74.3				

Note: Includes osteoarthritis of any kind or degree. Young (15-35 years), Middle (35-5C years), Old (50+ years), A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). Includes 39 males and 35 females with age interval estimates. **Bold** indicates statistical significance (α=0.10).

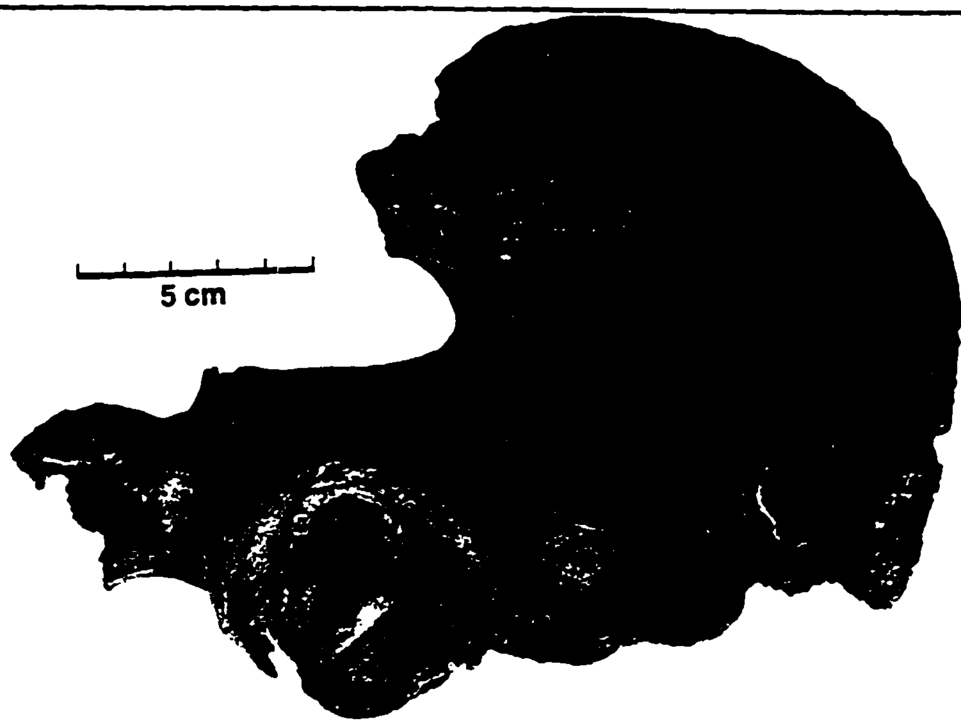


Figure 4.30. Marked Osteoarthritis of the Right Acetabulum

Figure 4.31. Marked Osteoarthritis of the Right Femoral Head

Summary of Appendicular Osteoarthritis

Osteoarthritic changes to the articular surfaces of the appendicular skeleton are noted in 51.9% of the articular surfaces examined in Ban Chiang adults. Osteoarthritis is greater in the articular surfaces of the lower limb (55.7%) than the upper limb (47.6%), and is more common in males than in females. Advanced osteoarthritis is uncommon in these remains, observed in only 4% of the affected upper limb facets, and 6% of the affected lower limb facets. Advanced osteoarthritis is more common in males than in females.

Slight osteoarthritis is noted in both sexes by early adulthood (20-25 years), with advanced observations occurring at a younger age in males (25-30 years) than in females (35-40 years). There is no apparent difference in age-at-occurrence and articular site. There is no obvious temporal trend in the prevalence of osteoarthritis when the sexes are combined, but when the osteoarthritis is examined by sex, there is a statistically significant increase in osteoarthritis in Late Group males, and a decrease in Late Group females. These differences are partially explained by a skewed age-at-death distribution, and generally disappear when age is controlled even in broad categories.

Axial Skeleton Osteoarthritis

The axial skeleton, including the skull, ribs, and vertebral column, presents a complex array of varying articular joints. There are arthrodial joints (i.e. those in which a gliding movement is allowed (Gray 1901:220) present in the occipital-first cervical, first and second cervical vertebrae, and at the rib heads and tubercles, as well as in the posterior facets of the vertebrae. In addition, the "joints" between the vertebral bodies, classified as mixed articulations, are symphyses in which contiguous bones are joined by fibro-cartilage. Degenerative changes vary depending on the type of joint being examined. In the arthrodial joints, similar to the majority of the joints of the appendicular skeleton, changes include pitting, lipping, eburnation, etc. In the symphyses of the vertebrae, there may be either upward lipping or outward lipping of the rim of the body, as well as porosis of the vertebral end-plate. Additionally, systematic observations of schmorl's nodes have been recommended to be important contributions to the study of degenerative disease.

Temporo-Mandibular Joint Osteoarthritis

The temporo-mandibular joint (TMJ), made up of the mandibular condyle and the mandibular fossa of the occipital bone, was observed for osteoarthritis in 38 Ban Chiang adults (Table 4.96). In the males, there is more osteoarthritis in the left mandibular condyle (40.0%, 2/5) than the right (23.1%, 3/13); while the reverse is true in the female condyles (right 30.0%, left 18.2%). When the sexes are combined, there is very little difference in osteoarthritis prevalence between the right and left mandibular condyle (26.1% : 25.0%, respectively). The two observations of advanced osteoarthritis (moderate lipping and moderate porosis) are noted in a male left mandibular condyle, and a female right mandibular condyle.

Table 4.96. Temporo-Mandibular Joint Osteoarthritis in Ban Chiang Adults

Articular Surface Osteoarthritis	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
R Mandibular Condyle None	10/13	76.9	7/10	70.0	17/23	73.9
Slight lipping	0/13	0.0	2/10	20.0	2/23	8.7
Slight porosis	3/13	23.1	0/10	0.0	3/23	13.0
Moderate porosis	0/13	0.0	1/10	10.0	1/23	4.3
L Mandibular Condyle None	3/5	60.0	9/11	81.8	12/16	75.0
Slight lipping	0/5	0.0	1/11	9.1	1/16	6.3
Moderate lipping	1/5	20.0	0/11	0.0	1/16	6.3
Slight porosis	1/5	20.0	1/11	9.1	2/16	12.5
R Mandibular Fossa None	14/19	73.7	13/14	92.9	27/33	81.8
Slight lipping	2/19	10.5	0/14	0.0	2/33	6.1
Slight porosis	3/19	15.8	0/14	0.0	3/33	9.1
Slight lipping & porosis	0/19	0.0	1/14	7.1	1/33	3.0
L Mandibular Fossa None	14/19	73.7	10/12	83.3	24/31	77.4
Slight lipping	3/19	15.8	0/12	0.0	3/31	9.7
Slight porosis	2/19	10.5	1/12	8.3	3/31	9.7
Slight lipping & porosis	0/19	0.0	1/12	8.3	1/31	3.2

Note: R=right, L=left, A=affected, O=observed. Includes 38 individuals: 21 males and 17 females.

In the mandibular fossae, again, there is little difference in the right and left sides of the combined sample (6/33, 18.2% : 22.6%, 7/31; respectively). Males have slightly more osteoarthritis of the mandibular fossae (26.3%, 10/38) than females (3/26, 11.5%). No advanced observations are noted in the mandibular fossa. In both sexes, the initial observations of osteoarthritis in the TMJ occur in the 35-40 year age interval. The advanced observations are not noted until age 45-50 years in males, and 40-45 years in females.

While there is slightly more osteoarthritis of the TMJ in males (26.8%) than in females (17.0%), the difference is not statistically significant (Table 4.97). In males, the two components of the TMJ have nearly identical frequencies of osteoarthritis, while in females there is a greater prevalence of osteoarthritis in the mandibular condyle than in the mandibular fossa.

Table 4.97. Prevalence of Temporo-Mandibular Joint Osteoarthritis, By Sex, in Ban Chiang Adults

Articulation Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
Mandibular Condyles	5/18	27.8	5/21	23.8	FET	1.000
Mandibular Fossae	10/38	26.3	3/26	11.5	χ^2=2.083	0.149
Total TMJ	15/56	26.8	8/47	17.0	χ^2=1.405	0.236

Note: Sides combined, all types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability), TMJ=temporo-mandibular joint. Includes 38 individuals: 21 males, 17 females.

Table 4.98. Temporal Change in Temporo-Mandibular Joint Osteoarthritis in Ban Chiang Adults

TMJ Osteoarthritis Present	Early Group		Late Group		Statistic	
	A/O	%	A/0	%	Test	Probability
Male	10/31	32.3	5/25	20.0	χ^2=1.060	0.303
Female	3/15	20.0	3/28	10.7	FET	0.647
Total	13/46	28.3	8/53	15.1	χ^2=2.554	0.110

Note: Sides combined, all types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability), TMJ=temporo-mandibular joint. Includes 38 individuals: 21 males, 17 females.

Since there are no statistically significant differences in the prevalence of osteoarthritis in males and females from Ban Chiang, to examine temporal changes the sexes will be collapsed. Although there is a decrease in prevalence of osteoarthritis over time in both males and females, the differences are not statistically significant (Table 4.98).

Osteoarthritis of the temporo-mandibular joint (TMJ) demonstrates no difference in prevalence between the right and left sides, between males and females, or between the Early and Late Groups at Ban Chiang. There are only two observations of advanced osteoarthritis (one each in a male and female), the most common alteration is articular lipping, and the total prevalence of osteoarthritis in articular facets of the TMJ is 22.3% (23/103).

Cervical Vertebral Osteoarthritis

Occipital-Cervical Complex

The articulations of the first two cervical vertebrae and the occipital condyles of the skull are special cases of vertebral articulations because of the wider range of motion of these joints. The articulations of the occipital condyles with the superior first cervical vertebra (occiput-C1), the first and second cervical interface at the facets (C1-2 facets) and at the dens, make up this complex and observations of osteoarthritis are summarized in Table 4.99.

Table 4.99. Occipital-Cervical Complex Osteoarthritis in Ban Chiang Adults

Articular Surfaces Osteoarthritis Present		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
Occiput-C1	None	7/47	14.9	12/36	33.3	19/83	22.9
	Slight lipping	39/47	83.0	24/36	66.7	63/83	75.9
	Moderate lipping	1/47	2.1	0/36	0.0	1/83	1.2
C1-2	None	2/48	4.2	9/40	22.5	11/88	12.5
	Slight lipping	44/48	91.7	31/40	77.5	75/88	85.2
	Slight porosis	2/48	4.2	0/40	0.0	2/88	2.3
Dens Facets	None	8/26	30.8	9/21	42.9	17/47	36.2
	Slight lipping	14/26	53.8	11/21	52.4	25/47	53.2
	Moderate lipping	3/26	11.5	1/21	4.8	4/47	8.5
	Marked lipping	1/26	3.8	0/21	0.0	1/47	2.1

Note: Sides combined, C=cervical, A=affected, O=observed. Includes 36 individuals: 19 males and 17 females.

Most of the articulations of the occiput-C1 are osteoarthritic (77.1%, 64/83), with slight lipping as the predominant observation (98.4%, 63/64). The prevalence of osteoarthritis of the C1-2 interface is also high (87.5%, 77/88), again, with a predominance of slight lipping (97.4%, 75/77). Similar results are evident in the articulations of the dens (63.8%, 30/47), with the exception of the presence of advanced observations (moderate and marked) in 16.7% of the affected facets (5/30).

The prevalence of osteoarthritis in the articulations of the upper cervical spine is greater in males than in females (Table 4.100), a difference which is statistically significant in the occiput-C1 and the C1-2 interfaces. The majority of observations of advanced osteoarthritis occur in males, as well. In both sexes, observations of slight osteoarthritis are noted in the earliest adult age intervals and advanced observations are restricted to late middle age (45-50 years). Although the male sample is skewed toward the late middle-age intervals, controlling for age still results in a significantly greater prevalence of osteoarthritis in males.

Table 4.100. Prevalence of Occipital-Cervical Complex Osteoarthritis, By Sex, in Ban Chiang Adults

Articulation Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
Occiput-C1	40/47	85.1	24/36	66.7	**χ^2=3.927**	**0.048**
C1-2	46/48	95.8	31/40	77.5	**χ^2=6.705**	**0.010**
Dens	18/26	69.2	12/21	57.1	χ^2=0.735	0.391

Note: Sides combined, all types and degrees of osteoarthritis, C=cervical, A=affected, O=observed. Includes 36 individuals: 19 males, 17 females. **Bold** indicates statistical significance (α=0.10).

Temporal Changes in Occipital-Cervical Osteoarthritis

Examining the prevalence of osteoarthritis in male occipital-cervical articulations over time (Table 4.101), shows a decrease in occiput-C1 osteoarthritis in the Late Group (92.3% : 76.2%), and increases in osteoarthritis of the C1-2 interface (93.3% : 100.0%), and the dens (56.3% : 90.0%). Only the latter change is statistically significant (bold cell).

In the female occipital-cervical articulations, there is an increase in osteoarthritis of the occiput-C1 interface in the Late Group (54.5% : 70.8%), a decline in osteoarthritis of the C1-2 interface (100.0% : 67.9%) and the dens (60.0% : 56.3%). The former decrease is the only statistically significant change. When the sexes are combined, there is a general trend toward declining prevalences of osteoarthritis of the occiput-C1 (81.6% : 73.3%) and the C1-2 level (94.9% : 80.4%), and a slight increase in the dens osteoarthritis (57.1% : 69.2%).

Table 4.101. Temporal Change in Occipital-Cervical Complex Osteoarthritis in Ban Chiang Adults

Sex/Articulations Osteoarthritis Present		Early Group		Late Group		Statistic	
		A/O	%	A/0	%	Test	Probability
Male	Occiput-C1	24/26	92.3	16/21	76.2	FET	0.217
	C1-2	28/30	93.3	18/18	100.0	FET	0.521
	Dens	9/16	56.3	9/10	90.0	**FET**	**0.099**
Female	Occiput-C1	6/11	54.5	17/24	70.8	FET	0.451
	C1-2	9/9	100.0	19/28	67.9	**FET**	**0.079**
	Dens	3/5	60.0	9/16	56.3	FET	1.000
Total	Occiput-C1	7/38	81.6	33/45	73.3	χ^2=0.794	0.373
	C1-2	37/39	94.9	37/46	80.4	**χ^2=3.905**	**0.048**
	Dens	12/21	57.1	18/26	69.2	χ^2=0.735	0.391

Note: Sides combined, all types and degrees of osteoarthritis, A=affected, O=observed, C=cervical, FET=Fisher's Exact Test (two-tailed probability). Includes 36 individuals: 19 males, 17 females. **Bold** indicates statistical significance (α=0.10).

Summary of Occipital-Cervical Osteoarthritis

The unique articulations of the occipital bone of the cranium, and the first and second cervical vertebrae exhibit osteoarthritic changes in the majority of observations at Ban Chiang: Occiput-C1, 77.1%; C1-2, 87.5%; and dens facets, 63.8%. Males have significantly greater prevalences of osteoarthritis of the occiput-C1 and C1-2 articulations than females. Although the prevalence of osteoarthritis of the dens facets is more equal, males have more advanced observations than females in this region. Temporal changes in osteoarthritis are variable depending upon sex. There is a statistically significant increase in osteoarthritis of the dens in the Late Group males, and a decline in osteoarthritis of the C1-2 interface in Late Group females. When the sexes are combined, there is a significant decline in osteoarthritis of the C1-2 interface in the Late Group.

Second through Seventh Cervical Vertebral Osteoarthritis

Osteoarthritis of the articular facets and end-plates of the remainder of the cervical vertebrae, i.e. the inferior facets and centrum of the second cervical vertebra (C2) through the seventh cervical vertebra (C7), is summarized in Table B.13. Forty-five adults are represented by these elements. Osteoarthritis, primarily in the form of lipping, is noted in 59.6% of the articular facets of the cervical region. Advanced observations are uncommon, accounting for 4.2% of all affected facets (14/330), and occurring more often in males (12/196, 6.1%) than females (2/134, 1.5%). In males, the upper cervical (C2-5) facets are less often affected by osteoarthritis than the lower ones (C5-7), while in females, the opposite is true.

In the cervical end-plates, osteoarthritic changes are found in 25.8% of the cervical end-plates (66/256). Porosis is the most common observation (83.3%, 55/66) in the affected bodies, followed by lipping (7/66, 10.6%). Advanced observations are recorded in 13.6% of the affected end-plates (9/66), more commonly in females (16.0%, 4/25) than in males (12.2%, 5/41). The C4-5 cervical end-plates are more often osteoarthritic than other cervical interfaces.

The prevalence of all osteoarthritis in the cervical vertebral articular facets and end-plates (Table 4.102), shows statistically significant sex differences in several interfaces. Except at the C6-7 facet interface, males have more osteoarthritis than females, with statistically significant differences at C2-3, C7-T1, and in the summed facets.

In the cervical vertebral end-plates, there is slightly more osteoarthritis in males than females, but the difference is statistically significant only in the C3-4 interface. Osteoarthritis prevalence in the summed cervical end-plates is nearly identical in males (28.5%) and females (22.3%).

Table 4.102. Prevalence of Cervical Vertebral Osteoarthritis, By Sex, in Ban Chiang Adults

Cervical Articulations Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
FACETS						
C2-3	36/44	81.8	24/38	63.2	**χ^2=3.617**	**0.057**
C3-4	32/44	72.7	26/46	56.5	χ^2=2.578	0.108
C4-5	34/45	75.6	24/40	60.0	χ^2=2.364	0.124
C5-6	27/47	57.4	22/41	53.7	χ^2=0.127	0.721
C6-7	25/57	43.9	21/43	48.8	χ^2=0.244	0.621
C7-T1	42/66	63.6	17/43	39.5	**χ^2=6.091**	**0.014**
Total	196/303	64.7	134/251	53.4	**χ^2=7.278**	**0.007**
END-PLATES						
C2-3	3/22	13.6	6/19	31.6	FET	0.157
C3-4	10/25	40.0	3/20	15.0	**χ^2=3.380**	**0.066**
C4-5	8/23	34.8	6/19	31.6	χ^2=0.048	0.826
C5-6	5/21	23.8	4/18	22.2	FET	0.605
C6-7	9/27	33.3	4/18	22.2	χ^2=0.649	0.420
C7-T1	6/26	23.1	2/18	11.1	FET	0.274
Total	41/144	28.5	25/112	22.3	χ^2=1.246	0.264

Note: All types and degrees of osteoarthritis, A=affected, O=observed, C=cervical, T=thoracic, FET=Fisher's Exact Test (one-tailed probability). Includes 45 individuals: 25 males and 20 females. **Bold** indicates statistical significance (α=0.10).

Table 4.103. Cervical Vertebral Osteoarthritis By Age and Sex in Ban Chiang Adults

CERVICAL Articulations % Affected/Observed		Age Interval in Years									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
FACETS											
Male	# Individuals	0	0	2	1	6	3	9	1	0	22
	# Facets			40	14	61	33	133	2		283
	Slight			30.0	100.0	62.3	48.5	70.7	100.0		62.2
	Advanced						9.1	6.8			4.2
Female	# Individuals	1	1	4	1	5	2	4	0	1	19
	# Facets	23	3	57	24	66	31	41		2	247
	Slight			24.6	54.2	66.7	93.5	78.0			53.4
	Advanced						6.5				0.8
END-PLATES											
Male	# End-plates			21	9	31	18	52		2	133
	Slight					25.8	16.7	32.7		50.0	21.8
	Advanced					9.7		3.8			3.8
Female	# End-plates	12	6	27	12	22	8	23		2	112
	Slight					27.3	25.0	56.5			18.8
	Advanced					4.5	12.5	8.7			3.6

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 22 males, 19 females.

Examining the prevalence of cervical vertebral osteoarthritis by sex and age (Table 4.103), documents a fairly even distribution of observations in the middle and older age intervals. The male sample is under-represented in the younger age intervals. Slight osteoarthritis in the cervical vertebral facets is not noted until the age of 25-30, and is common by the next interval (30-35 years) in both sexes. There are no obvious differences between the levels of the cervical spine. Osteoarthritis in the cervical bodies occurs later in both sexes, noted in approximately one quarter of the end-plates observed by the age of 35-40 years. There are no obvious differences in the prevalence of osteoarthritis of the cervical vertebrae by age between the sexes.

Temporal Changes in Cervical Osteoarthritis

Evaluating temporal changes in the prevalence of cervical vertebral osteoarthritis, it is apparent that male vertebrae have significantly more osteoarthritis of both the facets and the end-plates in the Late Group (Table 4.104). In the female cervical vertebrae, while there is a general trend toward increased osteoarthritis in the Late Group, there is variety at each level, and the only statistically significant differences are found in the cervical facets (bold cells). The sample sizes in the male Late Group and female Early Group vertebral facets are quite small and are likely to skew these results.

Table 4.104. Cervical Vertebrae Osteoarthritis, By Sex and Group, in Ban Chiang Adults

Articulation Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
FACETS												
C2-3	21/26	80.8	15/18	83.3	FET	0.726	2/5	40.0	18/29	62.1	FET	0.328
C3-4	15/24	62.5	17/20	85.0	**χ^2=2.78**	**0.095**	1/6	16.7	21/36	58.3	**FET**	**0.072**
C4-5	17/26	65.4	17/19	89.5	**FET**	**0.063**	2/8	25.0	18/28	64.3	**FET**	**0.058**
C5-6	9/27	33.3	18/20	90.0	**χ^2=15.1**	**0.000**	5/9	55.6	14/29	48.3	FET	0.776
C6-7	7/32	21.9	18/25	72.0	**χ^2=14.3**	**0.000**	3/10	30.0	15/30	50.0	FET	0.233
C7-T1	23/38	60.5	19/28	67.9	χ^2=0.37	0.541	2/11	18.2	11/28	39.3	FET	0.191
Total	92/173	53.2	104/130	80.0	**χ^2=23.4**	**0.000**	15/49	30.6	97/180	53.9	**χ^2=8.35**	**0.004**
END-PLATES												
C2-3	1/14	7.1	2/8	25.0	**FET**	**0.291**	2/3	66.7	4/14	28.6	FET	0.971
C3-4	3/15	20.0	7/10	70.0	**FET**	**0.018**	0/2	0.0	3/16	18.8	FET	0.686
C4-5	3/13	23.1	5/10	50.0	FET	0.184	1/3	33.3	4/15	26.7	FET	0.828
C5-6	2/12	16.7	3/9	33.3	FET	0.353	1/4	25.0	3/14	21.4	FET	0.803
C6-7	2/14	14.3	7/13	53.8	**FET**	**0.037**	0/5	0.0	4/13	30.8	FET	0.234
C7-T1	3/15	20.0	3/11	27.3	FET	0.509	0/5	0.0	2/12	16.7	FET	0.485
Total	14/83	16.9	27/61	44.3	**χ^2=12.9**	**0.000**	4/22	18.2	20/84	23.8	FET	0.403

Note: FET=Fisher's Exact Test (one-tailed probabilities), A=affected, O=observed, C=cervical, T=thoracic. Includes 44 individuals: 25 males, 19 females. **Bold** indicates statistical significance (α=0.10).

The group differences noted within the sexes above are supported when the sexes are combined and age is controlled by general categories (Table 4.105). In the cervical facets, there is a statistically significant increase in osteoarthritis in both the young and middle age groups, the sample size in the old-aged group is too small for valid conclusions. Sex-specific analysis, controlling for age, also reveals statistically significant increases in osteoarthritis in the young and middle-aged males, and in young adult females.

Samples sizes of the cervical end-plates are very small. There is no osteoarthritis noted in the young adult age intervals in either group sample. In the middle-aged adult end-plates, there is a statistically significant increase in osteoarthritis in the Late Group. The overall trend in both cervical facets and end-plates is increased osteoarthritis in the Late Group which is independent of the age-at-death distribution of the samples.

Table 4.105. Cervical Vertebral Osteoarthritis, Controlling for Age

CERVICAL Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	Test	Test	*p*
FACETS						
Young	15/68	22.1	38/93	40.9	**χ^2=6.288**	**0.012**
Middle	92/152	60.5	153/191	80.1	**χ^2=15.89**	**0.000**
Old	0/2	0.0	2/2	100.0	FET	0.333
END-PLATES						
Young	0/35	0.0	0/52	0.0		
Middle	18/68	26.5	39/80	48.8	**χ^2=7.705**	**0.006**
Old	0/2	0.0	1/2	50.0	FET	1.000

Note: A=affected, O=observed, young adult is 15-35 years, middle adult is 35-50 years and old is 50+ years. Includes only individuals with age-interval estimates: 41 individuals: 22 males, 19 females. **Bold** indicates statistical significance (α=0.10).

Summary of C2-7 Vertebral Osteoarthritis

Osteoarthritis is noted in 59.6% of the second through seventh cervical vertebral articular facets, with lipping as the most common alteration. In these vertebral end-plates, 25.8% are affected, the majority with porosis. Although male cervical articular surfaces have more osteoarthritis than females, statistically significant differences are noted only in the articular facets at the C2-3 and C7-T1 interfaces. There is a general trend toward an increase in osteoarthritis of the cervical articular facets and end-plates in both males and females over time, a trend supported when the sexes are combined and age is controlled.

Thoracic Vertebral Osteoarthritis

The thoracic vertebrae (T1-12) encompass the majority of the length of the spine, but are typically involved in the least amount of movement. Observations of the posterior articular facets and the vertebral end-plates, by interface, in 50 adults from Ban Chiang, are summarized in Table B.14. Osteoarthritis is noted in 64.4% (744/1155) of the posterior thoracic facets, with the majority of affected facets showing lipping accumulation of bone (96.4%, 717/744). Advanced observations are more common in males than females, and are seen in 5.5% of the affected facets (40/744). In males, the prevalence of osteoarthritis increases with each lower level of the thoracic spine, with the greatest frequencies at the T10-11 interface (86.3%, 69/80), followed by the T11-12 interface (85.3%, 58/68). In females, the progression is not as visible, and maximum frequency seen in the upper thoracic spine, T3-4 (63.2%, 24/38).

Osteoarthritis of the thoracic vertebral end-plates is present in 33.8% of the end-plates at Ban Chiang (162/479). Porosis is the most common observation in the end-plates (86.4%, 140/162), followed by lipping (8.0%, 13/162). Advanced observations (moderate and

Table 4.106. Prevalence of Thoracic Vertebral Osteoarthritis, By Sex, in Ban Chiang Adults

THORACIC Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
FACETS						
T1-2	49/69	71.0	18/42	42.9	**χ^2=8.651**	**0.003**
T2-3	40/58	69.0	21/38	55.3	χ^2=1.861	0.173
T3-4	38/56	67.9	24/38	63.2	χ^2=0.223	0.637
T4-5	40/57	70.2	20/38	52.6	**χ^2=3.016**	**0.082**
T5-6	40/53	75.5	16/44	36.4	**χ^2=15.068**	**0.000**
T6-7	43/55	78.2	18/41	43.9	**χ^2=11.915**	**0.001**
T7-8	49/60	81.7	16/44	36.4	**χ^2=22.229**	**0.000**
T8-9	58/70	82.9	18/44	40.9	**χ^2=21.394**	**0.000**
T9-10	56/72	77.8	11/34	32.4	**χ^2=20.491**	**0.000**
T10-11	69/80	86.3	13/44	29.5	**χ^2=40.751**	**0.000**
T11-12	58/68	85.3	29/50	58.0	**χ^2=11.082**	**0.001**
Total	540/698	77.4	204/457	44.6	**χ^2=129.032**	**0.000**
END-PLATES						
T1-2	8/26	30.8	3/16	18.8	FET	0.314
T2-3	10/24	41.7	2/14	14.3	**FET**	**0.080**
T3-4	9/22	40.9	0/14	0.0	**FET**	**0.005**
T4-5	9/22	40.9	0/15	0.0	**FET**	**0.004**
T5-6	9/21	42.9	0/14	0.0	**FET**	**0.004**
T6-7	11/23	47.8	1/17	5.9	**χ^2=8.189**	**0.004**
T7-8	12/23	52.2	2/17	11.8	**χ^2=7.016**	**0.008**
T8-9	13/25	52.0	1/15	6.7	**χ^2=8.469**	**0.004**
T9-10	13/26	50.0	0/10	0.0	**FET**	**0.004**
T10-11	12/25	48.0	2/15	13.3	**χ^2=4.952**	**0.026**
T11-12	18/27	66.7	7/21	33.3	**χ^2=5.259**	**0.022**
T12-L1	12/24	50.0	8/23	34.8	χ^2=1.113	0.292
Total	136/288	47.2	26/191	13.6	**χ^2=57.958**	**0.000**

Note: All types and degrees of osteoarthritis, A=affected, O=observed, T=thoracic, L=lumbar, FET=Fisher's Exact Test (one-tailed probability). Includes 50 individuals: 28 males and 22 females. **Bold** indicates statistical significance (α=0.10).

marked) are noted in only 3.7% of the affected end-plates (6/162), and occur only in males. In males the T11-12 interface has the greatest prevalence of osteoarthritic change (66.7%, 18/27); while in females, the T12-L1 interface is more often affected (34.8%, 8/23), followed closely by the T11-12 interface (33.3%, 7/21).

Combining all types of osteoarthritis, and examining the prevalence by sex (Table 4.106), documents significantly greater osteoarthritis in males at nearly every level of the thoracic articular facets and vertebral centra. The female sample of vertebral end-plates is relatively small and this may contribute to the large differences in osteoarthritis prevalence.

The significantly larger prevalence of osteoarthritis in male thoracic vertebral articulations at Ban Chiang may be the result of a skewed age-at-death distribution in males as opposed to females. Examining the distribution of thoracic osteoarthritis by sex and age, documents the small sample sizes within each age interval, as well as demonstrates that the Ban Chiang female sample is younger than the male sample (Table 4.107). However, examining the osteoarthritis prevalence within each age interval, reinforces the observations of a greater prevalence in male articulations.

In the thoracic articular facets, slight osteoarthritis is noted from the earliest age intervals in both males and females. Advanced observations occur in the middle-age intervals, but are rare. In the thoracic bodies, osteoarthritic changes in the end-plates are not prevalent until age 35-40 years, much later than the thoracic facets. Advanced osteoarthritis in the vertebral end-plates occurs at age 40-45 years (in males).

Table 4.107. Thoracic Vertebral Osteoarthritis By Age and Sex in Ban Chiang Adults

THORACIC Articulations % Affected/Observed		Age Interval in Years								Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	
FACETS										
Male	# Individuals	0	0	3	1	7	3	10	1	25
	# Facets			83	41	135	61	277	6	603
	Slight			19.3	95.1	62.2	85.2	87.4	100.0	72.8
	Advanced			1.2		2.2	4.9	9.0		5.3
Female	# Individuals	3	1	4	1	5	3	4	0	21
	# Facets	63	2	133	32	101	23	73		427
	Slight	1.6	100.0	30.8	43.8	64.4	95.7	68.5		45.7
	Advanced			1.5			4.3	1.4		0.9
END-PLATES										
Male	# End-plates	0	0	43	23	54	27	103	0	250
	Slight					55.6	11.1	60.2		38.0
	Advanced						3.7	4.9		2.4
Female	# End-plates	38	3	71	10	23	9	30		184
	Slight	5.3	100.0		10.0	17.4	44.4	40.0		14.1

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 25 males, 21 females.

Table 4.108. Thoracic Vertebral Osteoarthritis, By Sex and Group, in Ban Chiang Adults

THORACIC Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
FACETS												
T1-2	20/37	54.1	29/32	90.6	**χ^2=11.1**	**0.001**	2/10	20.0	14/30	46.7	FET	0.131
T2-3	16/32	50.0	24/26	92.3	**χ^2=12.0**	**0.001**	2/9	22.2	16/26	61.5	**FET**	**0.049**
T3-4	19/34	55.9	19/22	86.4	**χ^2=5.69**	**0.017**	5/9	55.6	15/25	60.0	FET	0.560
T4-5	21/34	61.8	19/23	82.6	**χ^2=2.85**	**0.091**	0/8	0.0	17/27	63.0	**FET**	**0.001**
T5-6	22/33	66.7	18/20	90.0	**FET**	**0.053**	1/8	12.5	12/33	36.4	FET	0.194
T6-7	19/30	63.3	24/25	96.0	**χ^2=8.51**	**0.003**	1/9	11.1	14/29	48.3	**FET**	**0.050**
T7-8	23/32	71.9	26/28	92.9	**χ^2=4.39**	**0.036**	1/10	10.0	13/32	40.6	**FET**	**0.075**
T8-9	26/34	76.5	32/36	88.9	χ^2=1.9	0.168	1/10	10.0	17/34	50.0	**FET**	**0.025**
T9-10	22/33	66.7	34/39	87.2	**χ^2=4.35**	**0.037**	0/8	0.0	11/26	42.3	**FET**	**0.027**
T10-11	31/38	81.6	38/42	90.5	χ^2=1.33	0.249	2/10	20.0	11/34	32.4	FET	0.371
T11-12	29/36	80.6	29/32	90.6	FET	0.205	8/12	66.7	21/38	55.3	χ^2=0.49	0.485
TOTAL	248/373	66.5	292/325	89.8	**χ^2=54.1**	**0.000**	23/103	22.3	161/334	48.2	**χ^2=21.6**	**0.000**

Table 4.108 (cont'd). Thoracic Vertebral Osteoarthritis, By Sex and Group, in Ban Chiang Adults

THORACIC Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
END-PLATES												
T1-2	5/16	31.3	3/10	30.0	FET	0.688	0/4	0.0	3/11	27.3	FET	0.363
T2-3	4/14	28.6	6/10	60.0	FET	0.132	0/4	0.0	2/10	20.0	FET	0.495
T3-4	3/14	21.4	6/8	75.0	**FET**	**0.022**	0/4	0.0	0/9	0.0		
T4-5	4/14	28.6	5/8	62.5	FET	0.135	0/4	0.0	0/9	0.0		
T5-6	5/14	35.7	4/7	57.1	FET	0.319	0/4	0.0	0/9	0.0		
T6-7	5/14	35.7	6/9	66.7	FET	0.154	1/5	20.0	0/12	0.0	FET	0.110
T7-8	6/14	42.9	6/9	66.7	FET	0.247	2/6	33.3	0/11	0.0	FET	0.110
T8-9	6/14	42.9	7/11	63.6	χ^2=1.07	0.302	1/5	20.0	0/10	0.0	FET	0.333
T9-10	5/14	35.7	8/12	66.7	χ^2=2.48	0.116	0/3	0.0	0/7	0.0		
T10-11	6/16	37.5	6/9	66.7	FET	0.163	2/5	40.0	0/10	0.0	**FET**	**0.095**
T11-12	10/17	58.8	8/10	80.0	FET	0.244	4/8	50.0	3/13	23.1	FET	0.213
T12-L1	3/12	25.0	9/12	75.0	**χ^2=6.00**	**0.014**	3/7	42.9	5/16	31.3	FET	0.467
TOTAL	62/173	35.8	74/115	64.3	**χ^2=22.5**	**0.000**	13/59	22.0	13/127	10.2	**χ^2=4.66**	**0.031**

Note: All types and degrees of osteoarthritis. FET=Fisher's Exact Test (two-tailed probabilities), A=affected, O=observed, T=thoracic, L=lumbar. Includes 49 individuals: 28 males, 21 females. **Bold** indicates statistical significance (α=0.10).

Temporal Change in Thoracic Osteoarthritis

The prevalence of osteoarthritis in the thoracic vertebrae of Ban Chiang adults increases in the Late Group (Table 4.108). The increase is present in both sexes, and in both the articular facets and the thoracic end-plates. In the articular facets, osteoarthritis prevalence in males increases from 66.5% in the Early Group to 89.8% in the Late Group, a statistically significant difference. The distribution of osteoarthritis over the thoracic spine appears to remain constant with a general increase at each level. Osteoarthritis of the thoracic articular facets also increases in Late Group females (22.3% : 48.2%), a shift which is again noted throughout the length of the thoracic spine.

In the thoracic vertebral bodies, osteoarthritis of the end-plates increases in males in the Late Group (35.8% : 64.3%), an increase taking place at each interface. In Late Group female thoracic vertebrae, however, osteoarthritis decreases from 22.0% to 10.2%. Again, the small number of observations in females is likely skewing the results.

Table 4.109. Thoracic Vertebral Osteoarthritis in Ban Chiang Adults Over Time, Controlling for Age

THORACIC Articulations Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	p
FACETS						
Young adult	29/171	17.0	87/183	47.5	**χ^2=37.53**	**0.000**
Middle-aged adult	242/305	79.3	286/345	82.9	**χ^2=1.341**	**0.247**
Old-aged adult			6/6	100.0		
END-PLATES						
Young adult	0/87	0.0	6/101	5.9	**FET**	**0.022**
Middle-aged adult	75/145	51.7	46/96	47.9	χ^2=0.335	0.563
Old-aged Adult						

Note: A=affected, O=observed, young adult is 15-35 years, middle adult is 35-50 years and old is 50+ years. Includes only individuals with age-interval estimates: 41 individuals: 22 males, 19 females. **Bold** indicates statistical significance (α=0.10).

Controlling for general age intervals (Table 4.109), it is immediately apparent that both groups lack old-aged individuals. The increased prevalence of articular facet osteoarthritis in the Late Group is present in both young and middle-aged individuals. In the thoracic end-plates, the results are less clear, perhaps because samples sizes are quite small, but a slight increase in osteoarthritis in young adults is seen, and no change in the middle-aged component of the sample.

Summary of Thoracic Osteoarthritis

Osteoarthritis is noted in 64.4% of the thoracic posterior articular facets in Ban Chiang adults, the most common change in these joints is articular lipping. In the thoracic vertebral end-plates, osteoarthritic changes, primarily porosis, are noted in 33.8% of the end-plates observed. The maximum prevalence of osteoarthritis of the facets and end-plates occurs at T10-12 in males, and T3-4 and T12-L1 respectively, in females. At every level of the thoracic spine, osteoarthritic changes are more common in males than females. Temporal changes in thoracic osteoarthritis include an increase in osteoarthritis of both the facets and end-plates in males, and an increase in osteoarthritis of the facets in females (the sample sizes of thoracic end-plates are very small). Combining the sexes and controlling for age, there is a statistically significant increase in osteoarthritis of the articular facets.

Rib Facet Osteoarthritis

Observations of osteoarthritis of the ribs includes the arthrodial joints of the rib head and tubercle and the rib facets on the vertebral body and transverse process. Potentially, each rib has two observations per side (head and tubercle), while each vertebra has one observation per side. The sides are combined, and the rib and vertebral scores are summed for a total score at each level.

The distribution of osteoarthritis in the rib facets in Ban Chiang adults is summarized in Table B.15. Approximately 56% of the observed facets exhibit osteoarthritis (675/1211), with more osteoarthritis in male facets (66.7%, 474/711) than in females (40.2%, 201/500). Overall, articular lipping is the most common arthritic change, accounting for 86.8% of the affected facets (586/675), followed by porosis (63/675, 9.3%) and a combination of the two (3.9%, 26/675)[See Figure 4.32]. Observations (moderate and marked) are noted in only 4.9% of the affected facets (33/675), and occur more often in males (5.1%, 24/474) than in females (4.4%, 9/201). All types and degrees of osteoarthritis will be combined for further analysis.

Osteoarthritis of the rib facets is more common in males than females, with statistically significant differences in the fifth through eighth, and tenth through twelfth ribs (Table 4.110.). Movement of the ribs gradually increases moving caudally, with movement of the upper two ribs restricted by the shoulder girdle. The presence of more osteoarthritis in the lower ribs may suggest that movement in these areas is greater in males, perhaps related to physical labor or aerobic exercise necessitating greater excursion of the chest. However, the difficulty inherent in identifying the level of fragmentary ribs, which were common at this site, suggests significant caution should be exercised in interpreting these data, and the more prudent course would be to combine all of the levels except perhaps the first four and last two ribs (i.e. one through four, eleven and twelve).

Table 4.110. Prevalence of Rib Facet Osteoarthritis, By Sex, in Ban Chiang Adults

Rib Number Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
One	39/76	51.3	12/46	26.1	**χ^2=7.497**	**0.006**
Two	38/65	58.5	23/43	53.5	χ^2=0.260	0.610
Three	34/58	58.6	19/41	46.3	χ^2=1.456	0.228
Four	37/57	64.9	22/42	52.4	χ^2=1.577	0.209
Five	46/63	73.0	28/54	51.9	**χ^2=5.603**	**0.018**
Six	48/75	64.0	17/49	34.7	**χ^2=10.205**	**0.001**
Seven	42/60	70.0	19/51	37.3	**χ^2=11.941**	**0.001**
Eight	41/66	62.1	12/37	32.4	**χ^2=8.366**	**0.004**
Nine	37/55	67.3	18/35	51.4	χ^2=2.259	0.133
Ten	40/51	78.4	13/33	39.4	**χ^2=13.113**	**0.000**
Eleven	39/49	79.6	7/35	20.0	**χ^2=29.267**	**0.000**
Twelve	33/36	91.7	11/34	32.4	**χ^2=26.349**	**0.000**
Total	474/711	66.7	201/500	40.2	**χ^2=83.352**	**0.000**

Note: All types and degrees of osteoarthritis, A=affected, O=observed. Includes 53 individuals: 28 males, 25 females. **Bold** indicates statistical significance (α=0.10).

Table 4.111. Rib Facet Osteoarthritis By Age and Sex in Ban Chiang Adults

Sex/Jaw Teeth A/O		Age Interval in Years									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Male	# Individuals	0	0	3	1	7	3	10	0	0	24
	# Facets			117	45	129	85	256			632
	Slight			39.3	73.3	51.2	51.8	80.9			62.7
	Advanced					0.8	7.1	5.5			3.3
Female	# Individuals	3	2	5	1	6	3	4	0	1	25
	# Facets	82	4	172	32	63	34	84		1	472
	Slight	1.2	0.0	33.7	18.8	50.8	67.6	75.0		0.0	38.7
	Advanced			1.2		1.6	8.8	2.4		100.0	1.9

Note: All types and degrees of osteoarthritis. A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 23 males, 23 females.

Examining the age distribution of rib facet osteoarthritis at Ban Chiang (Table 4.111) suggests there is little osteoarthritic change in early adulthood. The small sample sizes in all age intervals in both males and females complicates conclusions. Slight osteoarthritis does not occur until age 25-30 years, when approximately one-third of the facets in both males and females are affected. Advanced observations are not common until middle-age (40-45 years) in both sexes. No overt patterning in the rib numbers was evident.

Temporal Trends in Rib Osteoarthritis

Since there were statistically significant sex differences in the prevalence of osteoarthritis of the rib facets, any analysis of temporal trends must address possible sex differences over time (Table 4.112). In female rib facets, while the general trend is toward more osteoarthritis in the Early Group than in the Late Group; in the upper ribs, that trend is reversed. When all of the ribs are summed however, there is no significant difference.

In the male sample, there is more osteoarthritis in the Late Group than in the Early Group, a difference which is statistically significant overall, as well as in the second and fourth ribs. Although upper rib movement is restricted by the shoulder girdle, the presence of increased osteoarthritis in these upper ribs may suggest an increased use of the upper body in the later periods at Ban Chiang.

Table 4.112. Rib Facet Osteoarthritis, By Sex and Group, in Ban Chiang Adults

Rib Number Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
One	25/49	51.0	14/27	51.9	χ^2=0.005	0.945	0/13	0.0	9/27	33.3	**FET**	**0.019**
Two	19/39	48.7	19/26	73.1	**χ^2=3.812**	**0.051**	3/11	27.3	14/26	53.9	χ^2=2.198	0.138
Three	22/40	55.0	12/18	66.7	χ^2=0.697	0.404	1/7	14.3	15/31	48.4	FET	0.203
Four	23/40	57.5	14/17	82.4	**χ^2=3.235**	**0.072**	5/12	41.7	13/26	50.0	χ^2=0.229	0.632
Five-Ten	150/230	65.2	89/124	71.8	χ^2=1.579	0.209	30/75	40.0	69/172	40.1	χ^2=0.000	0.986
Eleven	24/32	75.0	15/17	88.2	FET	0.459	3/12	25.0	4/23	17.4	FET	0.670
Twelve	20/22	90.9	13/14	92.9	FET	1.000	5/10	50.0	6/24	25.0	FET	0.232
Total	283/452	62.6	191/259	73.7	**χ^2=9.186**	**0.002**	47/140	33.6	131/334	39.2	χ^2=1.343	0.247

Note: All types and degrees of osteoarthritis. FET=Fisher's Exact Test (two-tailed probabilities), A=affected, O=observed. Includes 53 individuals: 28 males, 25 females. Early Group=EP I-IV, Late Group= EP V - LP X. **Bold** indicates statistical significance (α=0.10).

The overall prevalence of osteoarthritis of the rib facets, combining the sexes, remains nearly equal over time (Table 4.113). However, on closer examination, there is a general increase in osteoarthritis in the upper ribs, and a decrease in osteoarthritis in the lower ribs in the Late Group. These differences reach statistical significance in the second and twelfth ribs.

Table 4.113. Prevalence of Rib Facet Osteoarthritis, By Group, in Ban Chiang Adults

Rib Number Osteoarthritis Present	Early		Late		Statistic	
	A/O	%	A/0	%	χ^2 Value	Probability
One	25/62	40.3	23/54	42.6	0.061	0.804
Two	22/50	44.0	33/52	63.5	**3.886**	**0.049**
Three	23/47	48.9	27/49	55.1	0.365	0.545
Four	28/52	53.8	27/43	62.8	0.772	0.379
Five-Ten	180/305	59.0	158/296	53.4	1.940	0.164
Eleven	27/44	61.4	19/40	47.5	1.626	0.202
Twelve	25/32	78.1	19/38	50.0	**5.886**	**0.015**
All Ribs	330/592	55.7	322/593	54.3	0.249	0.618

Note: All types and degrees of osteoarthritis, A=affected, O=observed. Includes 53 individuals: 28 males, 25 females. **Bold** indicates statistical significance (α=0.10).

Table 4.114. Rib Facet Osteoarthritis By Group, Controlling for Age

Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	χ^2 Value	p
Young Adult	66/218	30.3	80/234	34.2	0.790	0.374
Middle-aged Adult	261/371	70.4	178/254	70.1	0.005	0.942
Old-aged Adult	1/1	100.0				

Note: All types and degrees of osteoarthritis. A=affected, O=observed, Young is 15-35 years, Middle is 35-50 years and Old is 50+ years. Includes only individuals with age-interval estimates: 46 individuals: 23 males, 23 females. **Bold** indicates statistical significance (α=0.10).

Since osteoarthritis is age-related, the general differences in the groups should be examined controlling for age (Table 4.114). This analysis negates the findings of any temporal differences in the prevalence of rib facet osteoarthritis.

Summary of Rib Facet Osteoarthritis

Slightly more than half of the rib articular facets in adults at Ban Chiang exhibit osteoarthritic changes of which lipping is the most common (56.0%). There are few advanced observations. Males have more osteoarthritis than females at all levels of the thorax, and there is a general trend toward increased frequencies in the lower ribs. When osteoarthritis prevalence is examined over time, there is a statistically significant increase in the number of affected first rib facets in females, and in the second rib, fourth rib, and total rib facets in males. When the sexes are combined, the trend continues, but when the prevalence is examined controlling for age, there are no statistically significant changes.

Lumbar Vertebral Osteoarthritis

Forty-eight adults from Ban Chiang have one or more observations for osteoarthritis of the lumbar vertebral posterior facets or end-plates (L1-5). Observations of osteoarthritis in these elements are summarized in Table B.16. Most of the lumbar articular facets are affected by osteoarthritis (570/676, 84.3%), with the primary change being lipping (88.2%, 503/570), and 13.2% of the affected facets have advanced changes (moderate or marked). The prevalence of osteoarthritis of the lumbar facets is fairly consistent across the lumbar spine. Advanced changes are more prevalent in male facets (73/383, 19.1%) than in female facets (2/293, 0.7%).

Sixty-two per cent of the lumbar end-plates are affected in the male and female combined sample [Figure 4.33]. The most common change is porosis, accounting for half of the affected end-plates (51.1%, 70/137), followed by lipping (34/137, 24.8%). Advanced observations are, again, more common in male lumbar vertebrae (23/125, 12.4%) than in female vertebrae (2.1%, 2/94). The prevalence of osteoarthritis of the end-plates is greater in the lower lumbar elements.

Osteoarthritis of both the lumbar articular facets and the lumbar end-plates is more prevalent in males than in females (Table 4.115). Osteoarthritis in the lumbar articular facets is significantly greater in males at nearly every interface (bold cells), and is fairly consistent across the lumbar spine although the slight decline in osteoarthritis of the L5-S1 interface in both sexes is intriguing since this junction is one of high stress. In males, the highest prevalence of osteoarthritis occurs at the L3-4 interface (96.9%), while in females, the highest prevalence is one level down at L4-5 (80.4%).

Osteoarthritis of the lumbar end-plates is also greater in males (69.6%) than females (53.2%), but the difference reaches statistical significance only when all of the elements are combined. There is less consistency across the lumbar spine, but the low prevalence of osteoarthritis in the L1-2 end-plates is expected. Corresponding to the highest prevalences in the articular facets, the largest number of observations of osteoarthritis in the end-plates occurs at the L3-4 interface (80.0%) in males and the L4-5 interface in females (66.7%).

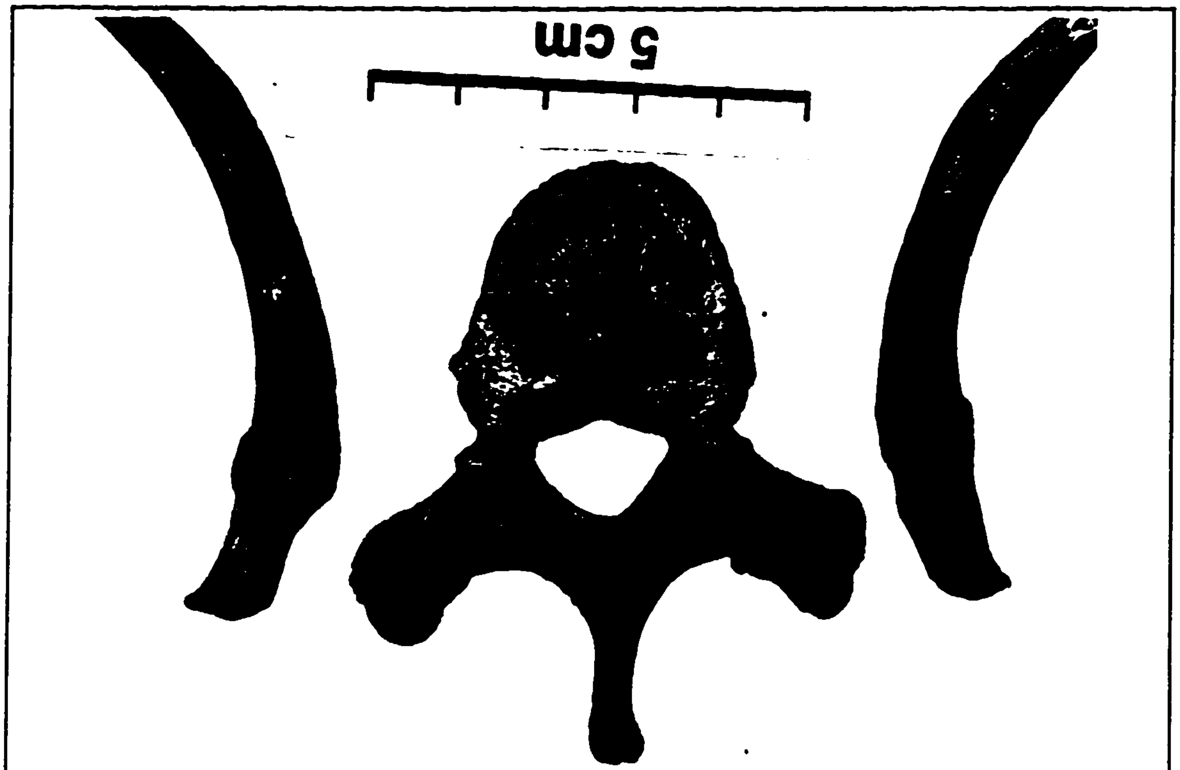


Figure 4.32. Moderate Rib Facet Osteoarthritis

Figure 4.33. Osteoarthritis of the First Lumbar Vertebra

Table 4.115. Prevalence of Lumbar Vertebral Osteoarthritis, By Sex, in Ban Chiang Adults

LUMBAR Articulations Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
FACETS						
T12-L1	59/62	95.2	38/52	73.1	**χ^2=10.870**	**0.001**
L1-2	64/67	95.5	41/58	70.7	**χ^2=14.264**	**0.000**
L2-3	64/69	92.8	39/51	76.5	**χ^2=6.394**	**0.011**
L3-4	63/65	96.9	36/53	67.9	**χ^2=18.173**	**0.000**
L4-5	60/65	92.3	37/46	80.4	**χ^2=3.445**	**0.063**
L5-S1	46/55	83.6	23/33	69.7	χ^2=2.367	0.124
Total	356/383	93.0	214/293	73.0	**χ^2=49.785**	**0.000**
BODIES						
L1-2	10/21	47.6	8/23	34.8	χ^2=0.748	0.387
L2-3	16/24	66.7	10/19	52.6	χ^2=0.874	0.350
L3-4	20/25	80.0	12/19	63.2	χ^2=1.544	0.214
L4-5	21/27	77.8	12/18	66.7	FET	0.499
L5-S1	20/28	71.4	8/15	53.3	χ^2=1.408	0.235
Total	87/125	69.6	50/94	53.2	**χ^2=6.167**	**0.013**

Note: All types and degrees of osteoarthritis, A=affected, O=observed, T=thoracic, L=lumbar, FET=Fisher's Exact Test (two-tailed probability). Includes 48 individuals: 28 males and 20 females. **Bold** indicates statistical significance (α=0.10).

The greater prevalence of osteoarthritis of the lumbar facets and end-plates in males may reflect a greater number of older aged individuals than are present in the female sample. Viewing the distribution of the summed facets and end-plates, by age interval, will help to illuminate these possible differences (Table 4.116). As noted in other sections above, the male sample is skewed toward the older age intervals, suggesting this as a possible explanation for the greater prevalence in males. However, osteoarthritis in the articular facets is present from the earliest age intervals (represented only by females) and prevalences are fairly consistent

Table 4.116. Lumbar Vertebral Osteoarthritis By Age and Sex in Ban Chiang Adults

Lumbar Articulations % Affected/Observed	Age Interval in Years								Total
	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	
Facets									
Male # Individuals	0	0	3	1	7	5	10	1	27
# Facets			42	12	58	39	173	12	336
Slight			59.5	100.0	89.7	56.4	77.4	83.3	75.9
Advanced					6.9	35.9	22.6	16.7	17.6
Female # Individuals	3	2	5	1	7	3	4	1	26
# Facets	44	27	77	21	50	0	58	2	279
Slight	18.2	77.8	68.8	90.5	86.0		96.6	100.0	72.4
Advanced					4.0				0.7
Lumbar End-plates									
Male # End-plates	0	0	19	0	20	12	48	8	107
Slight			5.3		65.0	33.3	66.7		46.7
Advanced					5.0	33.3	14.6	100.0	18.7
Female # End-plates	11	9	30	9	11	6	17	0	93
Slight		100.0		100.0	90.9	100.0	82.4		51.6
Advanced					9.1		5.9		2.2

Note: All types of osteoarthritis. A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 21 males, 19 females.

when examined within each age interval (e.g. male prevalence in the 35-40 year interval is 89.7%, while female prevalence is 86.0%).

Osteoarthritis of the vertebral end-plates is also noted in the younger age-intervals at Ban Chiang, and advanced observations occur by aged 35-40 years. The sex differences in osteoarthritis prevalence in the vertebral end-plates are not large and that is supported by the age distribution.

Temporal Differences in Lumbar Osteoarthritis

Isolating temporal differences, by sex, in the prevalence of lumbar vertebral osteoarthritis in Ban Chiang adults (Table 4.117) illustrates relatively little change over time in male articular facets (91.2% : 95.2%), and a rather large decrease in osteoarthritis in female articular facets (94.8% : 67.7%). Although this latter difference is statistically significant, the Early Group female sample sizes are too small to allow viable conclusions.

There is a statistically significant increase in osteoarthritis in male vertebral end-plates in the Late Group (56.6% : 95.2%), as well as an increase in osteoarthritis of female vertebral end-plates (48.3% : 55.4%). These increases occur over the length of the lumbar spine. Again, the differences may be age-related, and examination of the groups, controlling for age is necessary.

Table 4.117. Lumbar Vertebrae Osteoarthritis, By Sex and Group, in Ban Chiang Adults

LUMBAR Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
FACETS												
T12-L1	26/29	89.7	33/33	100.0	**FET**	**0.097**	8/11	72.7	30/41	73.2	FET	1.000
L1-2	32/32	100.0	32/35	91.4	FET	0.240	13/13	100.0	28/45	62.2	**FET**	**0.006**
L2-3	37/39	94.9	27/30	90.0	FET	0.646	9/9	100.0	30/42	71.4	**FET**	**0.094**
L3-4	39/41	95.1	24/24	100.0	FET	0.527	7/7	100.0	29/46	63.0	**FET**	**0.082**
L4-5	38/42	90.5	22/23	95.7	FET	0.648	9/9	100.0	28/37	75.7	FET	0.171
L5-S1	26/34	76.5	20/21	95.2	FET	0.131	9/9	100.0	14/24	58.3	**FET**	**0.032**
Total	198/217	91.2	158/166	95.2	χ^2=2.224	0.136	55/58	94.8	159/235	67.7	**χ^2=17.44**	**0.000**
END-PLATES												
L1-2	3/13	23.1	7/8	87.5	**FET**	**0.007**	2/6	33.3	6/17	35.3	FET	1.000
L2-3	9/17	52.9	7/7	100.0	**FET**	**0.054**	2/6	33.3	8/13	61.5	FET	0.350
L3-4	13/18	72.2	7/7	100.0	FET	0.274	3/6	50.0	9/13	69.2	FET	0.617
L4-5	13/18	72.2	8/9	88.9	FET	0.628	3/5	60.0	9/13	69.2	FET	1.000
L5-S1	9/17	52.9	11/11	100.0	**FET**	**0.009**	4/6	66.7	4/9	44.4	FET	0.608
TOTAL	47/83	56.6	40/42	95.2	**χ^2=19.65**	**0.000**	14/29	48.3	36/65	55.4	χ^2=0.407	0.523

Note: All types and degrees of osteoarthritis included. FET=Fisher's Exact Test (two-tailed probabilities), A=affected, O=observed. Includes 48 individuals: 28 males, 20 females. **Bold** indicates statistical significance (α=0.10).

When age is controlled in broad categories (Table 4.118), there are still statistically significant decreases in osteoarthritis of the lumbar articular facets, and an increase in osteoarthritis of the vertebral end-plates. The older-aged category is poorly represented in this site, and no conclusions are possible.

Table 4.118. Lumbar Vertebral Osteoarthritis in Ban Chiang Adults Over Time, Controlling for Age

LUMBAR Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
FACETS						
Young	59/79	74.7	78/143	54.5	**χ^2=8.734**	**0.003**
Middle-aged	192/194	99.0	172/182	94.5	**χ^2=6.055**	**0.014**
Old-aged	2/2	100.0	12/12	100.0		
END-PLATES						
Young	1/34	2.9	18/44	40.9	**χ^2=15.01**	**0.000**
Middle-aged	60/78	76.9	33/36	91.7	χ^2=3.563	0.059
Old-aged			8/8	100.0		

Note: All types and degrees of osteoarthritis. A=affected, O=observed, young adult is 15-35 years, middle adult is 35-50 years and old is 50+ years. Includes only individuals with age-interval estimates: 40 individuals: 21 males, 19 females. **Bold** indicates statistical significance (α=0.10).

Summary of Lumbar Osteoarthritis

As expected, osteoarthritis of the axial skeleton is greatest in the lumbar spine, with 84.3% of the articular facets and 62.0% of the vertebral end-plates demonstrating articular changes. While lipping remains the predominant type of osteoarthritis in the articular facets, in the vertebral end-plates, the porosis of the thoracic spine changes to lipping in the lumbar spine. There are more advanced observations in these lower elements as well. Generally, osteoarthritis is greater in male surfaces than female surfaces, but the differences are only statistically significant in the posterior articular facets. Over time, there are few significant changes, but the general trend is toward increased osteoarthritis in males. In females, there is decreased osteoarthritis of the facets, but an increase in end-plates affected. When the sexes are combined and age is controlled, there is a decrease in affected articular facets and an increase in affected end-plates.

Summary of Axial Osteoarthritis

Advanced osteoarthritis is uncommon in the axial skeletal elements from Ban Chiang; however, slight osteoarthritis is common in both males and females. In every functional unit examined, males have a greater prevalence of osteoarthritis, and more observations of advanced osteoarthritis, than females (Table 4.119). Articular lipping is the most common type of osteoarthritic change in the articular facets of the TMJ, occipital-cervical complex and the posterior articular facets of the vertebral column.

Table 4.119. Summary of Axial Skeleton Osteoarthritis in Ban Chiang Adults

Sex Facets	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
TMJ	15/56	26.8	8/47	17.0	23/103	22.3
Occipital-C1	40/47	85.1	24/36	66.7	64/83	77.1
C1-2	46/48	95.8	31/40	77.5	77/88	87.5
Dens	18/26	69.2	12/21	57.1	30/47	63.8
Cervical Facets	196/303	64.7	134/251	53.4	330/554	59.6
End-plates	41/144	28.5	25/112	22.6	66/256	25.8
Thoracic Facets	540/698	77.4	204/457	44.6	744/1155	64.4
End-plates	136/288	47.2	26/191	13.6	162/479	33.8
Ribs	474/711	66.7	201/500	40.2	675/1211	55.7
Lumbar Facets	356/383	93.0	214/293	73.0	570/676	84.3
End-plates	87/125	69.6	50/94	53.2	137/219	62.6

Note: All types and degrees of osteoarthritis included. A=affected, O=observed, C=cervical.

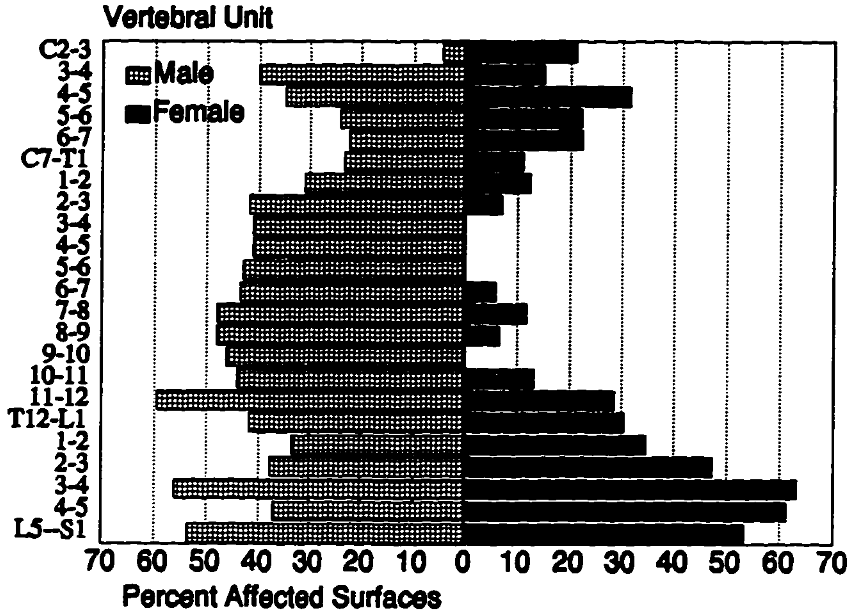


Figure 4.34. Vertebral End-Plate Osteoporosis

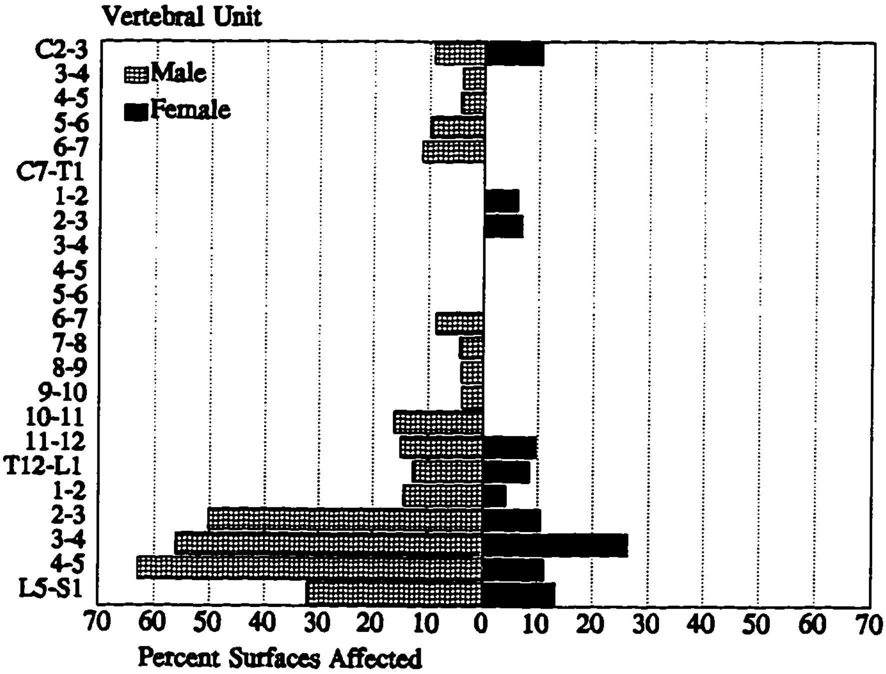


Figure 4.35. Vertebral End-Plate Osteophytosis

In the vertebral centra, porosis was the most common observation in both male and female end-plates (Figure 4.34). The kind of bi-modal distribution of porosis in female vertebrae is an interesting contrast to the fairly consistent prevalence in the male spine, undoubtedly reflecting a larger sample size in males, and the effects of greater weight and muscle mass on the spinal column.

Osteophytosis is much less common in the Ban Chiang spinal columns (Figure 4.35), particularly the female elements where prevalence is highest in the upper cervical, upper thoracic and lowest lumbar elements. In males, also, there is a conspicuous absence of end-plate osteophytosis in the upper thoracic vertebrae, a reflection of the physiological limited motion of this segment of the spine.

Examination of the age distribution of axial skeleton osteoarthritis demonstrates the appearance of slight articular changes in all surfaces by age 25-30 years. Advanced observations are not seen until 35-40 years, primarily in the lower spinal elements. There are no apparent differences in age occurrence between males and females.

The prevalence of osteoarthritis generally increases in the Late Group adults at Ban Chiang, a trend independent of the age-at-death distributions of each of the sub-samples. Osteoarthritis of the articular facets of the spinal column (Figure 4.36) increase in the cervical and thoracic elements, with a consistent prevalence in the lumbar facets in males. In females, the trend is not so apparent, with an increase in affected cervical and thoracic facets, and a decline in the lumbar facet osteoarthritis.

In the vertebral centra, combining both osteophytosis and osteoporosis, there is a readily apparent trend toward increased osteoarthritis in the Late Group males (Figure 4.37). There is little change in the female distribution over time, although a slight decline in the affected thoracic elements may represent poor preservation of this segment of the spine.

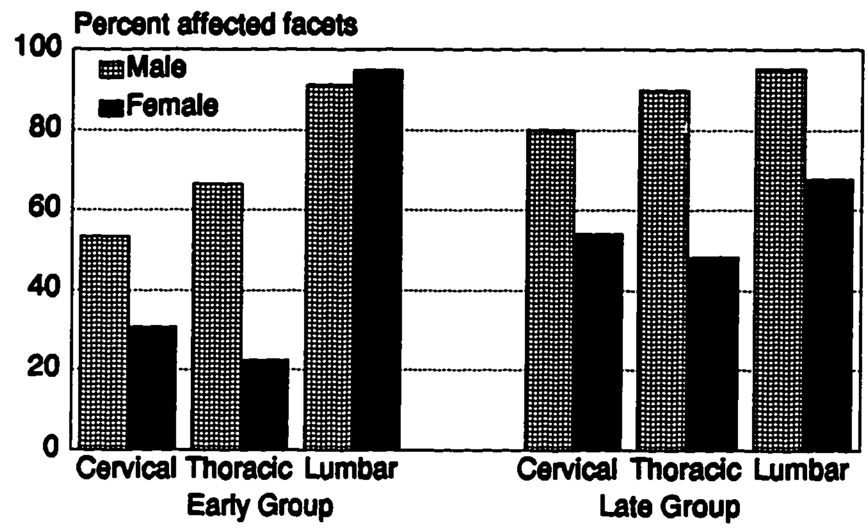


Figure 4.36. Temporal Trends in Articular Facet Osteoarthritis

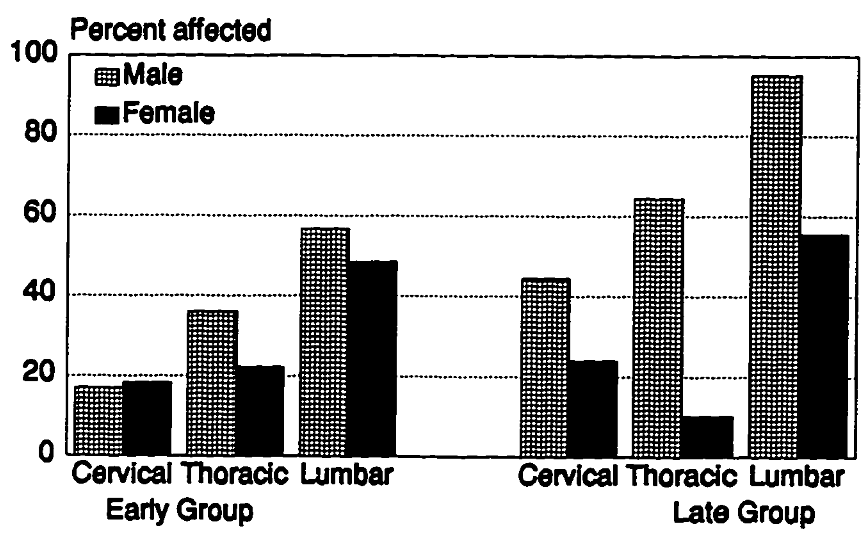


Figure 4.37. Temporal Trends in End-Plate Osteoarthritis

TRAUMA

The evidence for trauma in the human skeletal elements recovered at Ban Chiang consists primarily of healed fractures. Details of individual description and radiographic interpretation are given in the Burial Descriptions (Appendix C), and are only summarized in this discussion. Of primary interest in this discussion is which elements are affected,and by which type of trauma; what is the evidence of healing, is there disability; and finally, to establish population patterns and prevalence. Trauma includes any effect to the skeleton which results from other than ordinary "wear and tear", and includes secondary osteoarthritis resulting from sprains, dislocation, avulsions of ligaments, epiphyses or tubercles; and fractures.

Table 4.120. summarizes the evidence for trauma in the Ban Chiang skeletal series. There are several instances of skeletal elements with asymmetry of shape or length, but without the compelling evidence of angulation, remodeled callus, or circumferential thickening, to clinch the diagnosis as "healed fracture". Recognizing that not all asymmetry is the result of trauma, but also recognizing the enormous and absolute ability of the skeletal system to remodel bone (especially in early childhood), these cases are included as "equivocal fracture".

Table 4.120. Inventory of Trauma in the Ban Chiang Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
BC-2	F	Young adult	MP/LP	Right tibia	Smooth, elongated cortical lump (48x18 mm) on the proximal medial-anterior crest just below the level of the nutrient foramen. Smoothly graded margins. Tibial contusion.
BC-5	?M	Middle aged	MP VI	Right femur	Incomplete right femur shaft with a large, protruding ridge of dense cortical bone extending obliquely across the shaft at approximately the mid-point. No apparent lateral angulation but with the appearance of significant anterior bowing, medullary cavity is intact. Healed fracture.
BC-8	F	35-40	MP VI	L4, L5 vertebrae	Bilateral spondylolysis of both vertebrae, with coarse and porotic articulations. No evidence of spondylolisthesis.
				Left rib 12	Circumferential swelling of the shaft near the axial end, no angulation or overlap. Healed fracture.
BC-20	M	Young adult	MP VI	Frontal bone	Healed, depressed, oval-shaped defect on right side. Some mounding of the interior vault. Evidence of loss of a portion of the vault with healing from the perimeter. Healed fracture.
				C7 vertebra	The tip of the spinous process is flattened, with a coarse porotic cortical surface. Healed fracture.
BC-31	F	50-60	EP IV	Right radius	There is expansion and angulation of the distal end, with 30° of angulation, apex dorsal. Cortex completely remodeled but with a residual ridge of bone across the posterior shaft. Healed fracture.
BC-48	F	35-45	EP I-II	?L5 vertebra	Fragmentary superior articular facet with porotic, coarse inferior bone consistent with spondylolysis.
BCES-7	M	45-55	LP X	Left hamate	The hook of the left hamate is considerably reduced in size when compared to the opposite side. No evidence of callus formation or trauma to other carpals present. Possible healed fracture.
BCES-12	?M	9-12 mos	MP VIII	Right clavicle	The right clavicle is incomplete, but there is a raised ridge on the inferior surface just distal to the midshaft. There is asymmetry in the anterior-posterior diameter near the medial end. Possible healed fracture,

Table 4.120 (cont'd). Inventory of Trauma in the Ban Chiang Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
BCES-24	M	30-35	MP VII	Right MC 5	Thickened proximal shaft, with dorso-volar angulation of 22°, apex dorsal, no apparent rotational deformity, completely remodeled cortex. Healed fracture.
BCES-30	F	20-25	EP V	L5 vertebra	Complete spondylolysis at the pars interarticularis.
BCES-34	F	25-30	EP IV	Left humerus	The medial epicondyle is split into two tubercles, separated by a deep groove. No abnormality of the radius or ulna, no angulation or callus. Possible avulsion of the secondary ossification center (Figure 4.40).
BCES-35	M	45-50	EP IV	Left radius	Thickening of the proximal third of the shaft, inferior to biceps tubercle. Angulation (apex medial) of 10°, no rotational deformity. Ipsilateral humerus is also grossly bowed but without signs of fracture. Left ulna and hand bones are smaller than right. Healed fracture (Figure 4.38).
BCES-40	M	45-50	MP VII	Left ribs 9, 10, 11	Circumferential thickening slightly posterior to the apex, completely remodeled. Healed fractures.
				Right hip	Eburnation and marked osteoarthritis of the femoral head with extension of the rim of the articular surface inferiorly on the neck. Circumferential lipping of the acetabulum with a small region of eburnation. The left hip has slight osteoarthritis.
BCES-44	?F	2-4	EP III	Right clavicle	The right clavicle is 6 mm shorter than the left, but without any evidence of thickening or callus formation. Possible healed fracture.
BCES-45	M	45-50	EP IV	Left rib 6 Left rib 12	Circumferential thickening, healed callus of the body of the sixth, and near the head of the 12th. No displacement. Healed fractures.
BCES-46	F	45-50	EP IV	Left mid-ribs	Poor bone preservation results in fragments of two ribs with circumferential thickening, anterior expansion of the cortex and no displacement. Healed fractures.

Table 4.120 (cont'd). Inventory of Trauma in the Ban Chiang Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
BCES-47	M	45-50	EP III	Left rib 9, 10	Circumferential thickening of the apex of both ribs without angulation or deformity. Healed fractures.
				Right tibia	Extended, grooved, phalange of bone extending superiorly from the tibial tuberosity. Possible Osgood-Schlatter's disease.
				Left knee	Asymmetrical osteoarthritis, with articular lipping of the medial femoral condyle and medial tibial plateau.
BCES-50	M	25-30	EP IV	Frontal bone	Left lateral frontal bone, above supraorbital ridge has a depressed, circular breakage of the outer table. No reactive bone. Also, bilateral parietal bones with circular defects of both tables without signs of trephination, but with apparent breakage of the outside of one and the inside of the other. Possible perimortem trauma to the frontal bone (Figure 4.39).
				C6, C7 vertebrae	Flattening of the spinous processes of the sixth and seventh cervical vertebrae. Healed fracture.
BCES-53	M	Young adult	EP V	Right humerus	Marked lateral bowing (apex medial) of the shaft of the humerus, without rotation or thickening. Possible healed fracture.
BCES-65	M	40-45	EP IV	L5 vertebra	Complete spondylolysis with compression of the posterior centrum height
				Left tibia	Well healed expansion (40x19 mm) of the anterior spine of the tibia just distal to the midshaft. Longitudinal striations are evident on the medial side of the tibia. Tibial contusion.
BCES-73	M	35-40	MP VII	Hyoid	Circumferential thickening and slight displacement of the ?right horn of the hyoid. Healed fracture.
				Left MT 5	Enlarged, flattened and porotic lateral tubercle. Possible evulsion fracture.
				Left shoulder	Possible chronic dislocation. Present are the clavicle and scapula. There is erosion and flattening of the anterior border of the glenoid with an accessory facet carved out of the anterior surface of the scapula. The left clavicle is 11 mm longer than the right and appears much more gracile.

Table 4.120 (cont'd). Inventory of Trauma in the Ban Chiang Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
BCES-76	M	25-30	EP III	Left MC 4	The proximal shaft is thickened and has a dorso-volar angulation 38°, apex dorsal, no rotational deformity. A small osteophyte is present on the dorso-lateral surface. Healed fracture.

Note: M=males, F=female, EP=early period, MP=Middle Period, LP=Late Period, MC=metacarpal, MT=metatarsal, C=cervical, L=lumbar.

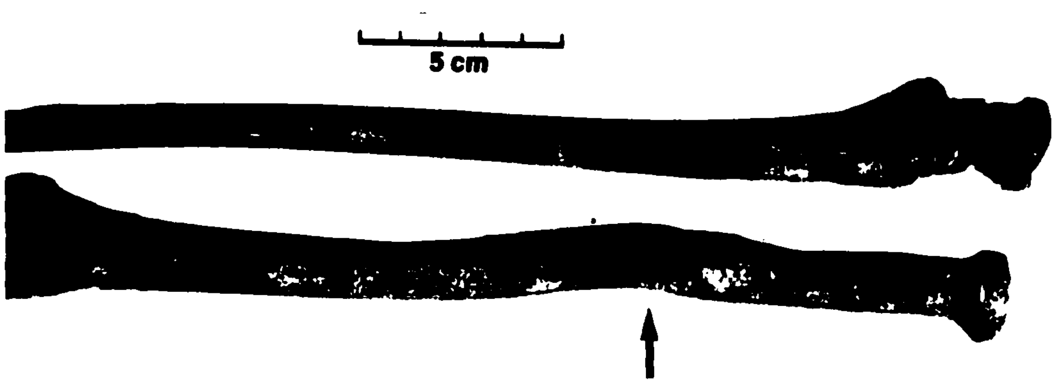


Figure 4.38. Healed Fracture of the Proximal Radius

[BCES-35]

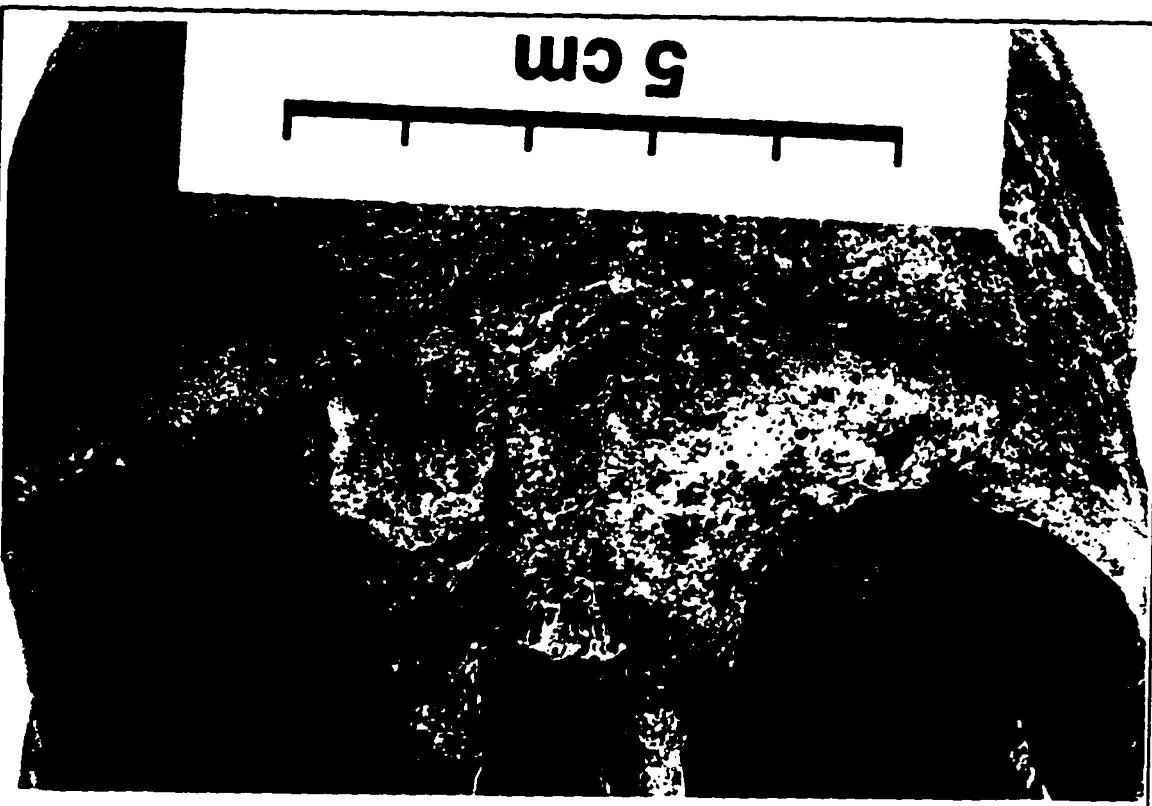


Figure 4.39. Possible Perimortem Fracture of the Frontal Bone

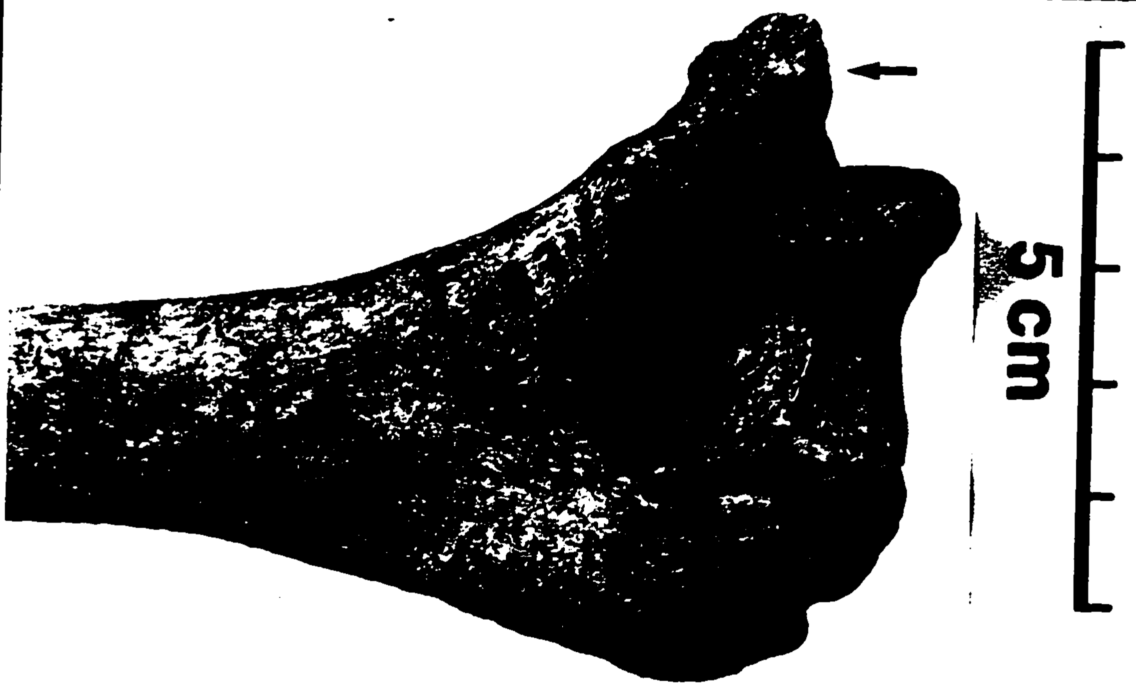


Figure 4.40. Healed Fracture of the Epicondyle of the Left Humerus

Traumatic injury is not common in the Ban Chiang skeletal series. Twenty-two individuals are observed with possible traumatic injury, seven of whom have more than one element affected (6 males, 1 female). There are 13 males, 7 females and 2 subadults. The two subadults both have evidence of possible clavicle fractures, a fracture not uncommonly sustained at birth. Of the unequivocal fractures found in this series, the most commonly fractured bone is the rib (five individuals), spondylolysis of the lower lumbar vertebrae (four individuals), followed by three individuals with skull fractures, and three individuals with hand fractures.

Only one of these burials exhibits possible peri-mortem trauma, Burial BCES-50, with a fracture of the skull. None of the fractures shows evidence of infection as a complication of healing. The presence of significant angulation in the fractures of the hand, radius, and femur, suggests that there was not advanced knowledge of fracture reduction (Roberts 1988).

The trauma frequencies in Ban Chiang adults are summarized in Table 4.121, by sex and side. Caution is necessary in many instances because of obvious sampling errors (e.g. there are few hyoid bones recovered). The highest prevalence of trauma in males is fracture of the hyoid (33.3%), followed by the seventh cervical vertebra (11.8%) and the frontal bone (7.7%). In females, spondylolysis of the lower lumbar vertebrae is the most frequent trauma (16.1%, 5/31). Obviously, the prevalence of any given trauma declines as the sides and sexes are summed.

Table 4.121. Prevalence of Trauma in Ban Chiang Adults

Type of trauma Element Site of trauma	Male						Female					
	Right		Left		Total		Right		Left		Total	
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
FRACTURES												
Frontal bone	1/13	7.7	1/13	7.7	2/26	7.7	0/11	0.0	0/12	0.0	0/23	0.0
Hyoid-horn					1/3	33.3					0/4	0.0
C6 Spinous process					1/13	7.7					0/12	0.0
C7 Spinous process					2/17	11.8					0/13	0.0
L4 Spondylolysis					0/20	0.0					1/15	6.7
L5 Spondylolysis					1/20	5.0					4/16	25.0
Ribs*	0/120	0.0	7/117	6.0	7/237	3.0	0/108	0.0	2/113	1.8	2/321	0.6
Humerus Distal end	0/17	0.0	0/19	0.0	0/34	0.0	0/14	0.0	1/15	6.7	1/29	3.4
Shaft	1/21‡	4.8	0/19	0.0	1/40‡	2.5	0/17	0.0	0/15	0.0	0/32	0.0
Radius Prox third	0/21	0.0	1/19	5.3	1/40	2.5	0/15	0.0	0/15	0.0	0/30	0.0
Distal third	0/18	0.0	0/15	0.0	0/33	0.0	1/11	9.1	0/10	0.0	1/21	4.8
Hamate	0/10	0.0	1/14	7.1	1/24	4.2	0/8	0.0	0/7	0.0	0/15	0.0
Metacarpal 4	0/19	0.0	1/15	6.7	1/34	2.9	0/11	0.0	0/11	0.0	0/22	0.0
Metacarpal 5	1/15	6.7	0/15	0.0	1/30	3.3	0/8	0.0	0/8	0.0	0/16	0.0
Femur Middle third	1/23	4.3	0/27	0.0	1/50	2.0	0/18	0.0	0/14	0.0	0/32	0.0
Metatarsal 5	0/15	0.0	1/20	5.0	1/35	2.9	0/15	0.0	0/10	0.0	0/25	0.0

Table 4.121 (cont'd.). Prevalence of Trauma in Ban Chiang Adults

Type of trauma Element Site of trauma	Male						Female					
	Right		Left		Total		Right		Left		Total	
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
DISLOCATION												
Shoulder*	0/17	0.0	1/18	5.6	1/35	2.9	0/15	0.0	0/10	0.0	0/25	0.0
ARTHRITIS†												
Hip	2/31	6.5	0/36	0.0	2/67	3.0	0/32	0.0	0/25	0.0	0/57	0.0
Knee	0/59	0.0	4/60	6.7	4/119	3.4	0/50	0.0	0/42	0.0	0/92	0.0
CONTUSIONS												
Tibia Diaphysis	0/25	0.0	1/25	4.0	1/50	2.0	1/23	4.3	0/23	0.0	1/46	2.2

Note: A=affected, O=observed. • Rib prevalence includes axial ends of ribs 3-12. * Noted in the scapula of one individual, prevalence by glenoid fossae observed. † Marked observations of osteoarthritis, prevalence by summed surfaces (e.g. femoral head and acetabulum; medial and lateral femoral condyles, and medial and lateral tibial plateau.

There are few patterns evident in the distribution of traumatic injury in the Ban Chiang skeletal series. Not unexpectedly there is more traumatic injury in the males at Ban Chiang than in the females. The majority of the injuries are isolated occurrences, suggestive of accidental injury, which is typically random. The presence of more spondylolysis in females, a fracture attributed to repeated stress to the lumbar spine from extension (i.e. arching backward), with a possible genetic predisposition, is unusual and enigmatic. The lower cervical vertebral fractures are called "clay-shoveler's fractures" and result from sudden severe muscle tension on the spinous processes which avulses the tip of the process. The last pattern evident in this series, is the fact that the majority of the rib fractures are of the left side.

Table 4.122. Temporal Distribution of Ban Chiang Adults with Trauma

<table>
<tr><th rowspan="2">Element Affected
# of Individuals</th><th colspan="4">Early Group</th><th colspan="6">Late Group</th></tr>
<tr><th>EP
I</th><th>EP
II</th><th>EP
III</th><th>EP
IV</th><th>EP
V</th><th>MP
VI</th><th>MP
VII</th><th>MP
VIII</th><th>LP
IX</th><th>LP
X</th></tr>
<tr><td>Skull</td><td></td><td></td><td></td><td>1*</td><td></td><td>1+</td><td>1</td><td></td><td></td><td></td></tr>
<tr><td>Clavicle</td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td>Shoulder disloc.</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1*</td><td></td><td></td><td></td></tr>
<tr><td>Humerus</td><td></td><td></td><td></td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Radius</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Hand</td><td></td><td></td><td>1</td><td></td><td></td><td></td><td>1</td><td></td><td></td><td>1</td></tr>
<tr><td>Femur</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tibia</td><td></td><td></td><td>1*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Contusion</td><td></td><td></td><td></td><td>1+</td><td></td><td></td><td></td><td></td><td colspan="2">1</td></tr>
<tr><td>Foot</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1*</td><td></td><td></td><td></td></tr>
<tr><td>Vertebrae</td><td></td><td></td><td></td><td>1*</td><td></td><td>1+</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Spondylolysis</td><td colspan="2">1</td><td></td><td>1+</td><td>1</td><td>1*</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ribs</td><td></td><td></td><td>1*</td><td>2</td><td></td><td>1*</td><td>1</td><td></td><td></td><td></td></tr>
</table>

Note: EP=Early Period, MP=Middle Period, LP=Late Period, #=number. * and + Denote fractures occurring in the same individual.

Examining the distribution of individuals with traumatic injury by phase (Table 4.122), supports the relative randomness of these injuries. The typical fractures of interpersonal violence (e.g. nasal bone fractures, distal ulna or "parry" fractures, cranial vault fractures of similar size and shape) are absent from the skeletal remains recovered at Ban Chiang.

INFECTIOUS LESIONS

As with trauma, instances of infection are also more common in Ban Chiang males (n=7) than females (n=3). Eleven individuals, ten adults and one newborn, have evidence of osteoclastic or osteoblastic activity which is consistent with infection (Table 4.123). Six individuals have evidence of osteoblastic activity at the time of death, while the remainder exhibit healed or remodeled infections, the majority of which involve the temporal bone.

Active lesions are noted in five adults and one newborn. Lesions in the adults include isolated evidence of active bone formation in the tibia and os coxae which might result from periosteal contusion, soft tissue injury or infection, or other non-specific causes. In the left lower ribs, periostitis of the anterior borders of several ribs may result from lung infection such as pneumonia and may suggest a cause of death in this individual.

The newborn (Burial BCES-43) is represented by fragmentary cranial vault bones, incomplete long limb diaphyses, including the left humerus, femora and tibiae; left scapula, a single rib and two cervical vertebral arch fragments (Figure 4.42). The absence of expansion and porosis of the cranial vault fragments present, and the appositional nature of the periosteal reactive bone on the long limb diaphyses suggests the lesions are not related to hematopoietic production. Alternative causes for newborn periostitis are: hypervitaminosis A, Caffey's disease, maternal infection, treponemal disease, etc. (Resnick and Niwayama 1981).

Table 4.123. Inventory of Possible Infectious Lesions in the Ban Chiang Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
BC-8	F	35-40	MP VI	Left auricular	Proliferative bone formation of the left auricular articular surface. Preservation is poor, but articular surface appears coarse and under magnification there is evidence of remodeling bone.
BC-9	M	Middle aged	MP VI	Right temporal	Small perforation of the right temporal bone above the auditory meatus which penetrates the outer cortex. Small amount of coarse porosity surrounding the defect. Radiograph shows uniform pneumatization of the mastoid.
BC-23	M	45-50	EP V	Left ribs ?8, 9, 10, 11	Active periostitis of the anterior rib bodies. All heads, tubercles and posterior borders appear normal. Under magnification, multiple thin cortical layers are visible, maximum thickness of 2 mm of reactive bone which does not involve the superior border of the ribs. There is fine chaotic bone present as well as remodeled areas.
				Hand phalanx	First proximal phalanx of the right first metacarpal appears enlarged, swollen, with a coarse texture to the cortex. There is no evidence of angulation or callus formation. There is a semi-circular depression (7x8 mm) on the lateral surface of the phalanx which has a smooth floor.
BC-3	F	Middle aged	LP X	Right tibia	Incomplete element, represented by the reconstructed shaft, missing the distal end and all but a small fragment of the proximal plateau. Between the nutrient foramen and the interosseous line of the posterior-lateral border there is appositional bone growth which is substantially remodeled. Layering is visible. Radiograph of the tibia indicates an increased density of the cortex in this region, but no evidence of fracture or disruption of the cortex.
BC-22	M	Middle aged	MP VII	Right temporal	Extremely enlarged right mastoid process, which is more of a mound than a process. No perforations or signs of infection. No apparent vault asymmetry. Radiograph documents the absence of pneumatic spaces, the process is dense but not sclerotic.
BC-24	M	30-35	MP VII	Right tibia	Large, oval-shaped area (58x24 mm) of active periostitis of the medial surface above the malleolus.

Table 4.123 (cont'd). Inventory of Infection in the Ban Chiang Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
BC-31	M	45-50	EP IV	Right os coxae	There is a large, smooth-walled, groove present in the medial edge of the os coxae, beginning at the inferior terminus of the sciatic notch and separating the spine. The groove runs obliquely from the superior edge laterally to the inferior edge posteriorly. The cortex is impressed with no evidence of active bone formation.
BC-34	F	20-25	EP IV	Temporals	Bilaterally, the mastoid processes are expansive. There are small, smooth-walled depressions of the suprameatal triangle where the cortical bone is pitted and coarse, with perforation on the right side. Radiograph demonstrates pneumatization with spaces of uniform size and shape.
BC-36	M	45-50	EP V/ MP VI	Right tibia	A shaft fragment extending from the proximal metaphysis to the mid-shaft exhibits a patch (53x22 mm) of active, unremodeled, periosteal bone growth of the anterior-medial surface near the distal end of the fragment. Cross-sectional view at the broken end shows apposition of a thin layer of periosteal bone.
BC-43	?M	Newborn	EP IV	Femoral and tibial diaphyses	Appositional bone on these diaphyses with the old cortex visible in areas of breakage. A new, incompletely remodeled cortical layer with a coarse appearance is evident. Radiograph documents the periostitis. Fragmentary cranial vault bones, a fragment of the mandible, left scapula, incomplete left humerus, two vertebral arch fragments, and a single rib also present and normal in appearance.
BC-45	M	45-50	EP IV	Temporal	Greatly inflated mound-like right mastoid process without perforations or active bone formation. Radiograph demonstrates two large open spaces int he right process without sclerosis.

Note: M=male, F=female, EP=Early Period, MP=Middle Period, LP=Late Period.

Evidence of possible childhood infection of the mastoid process (mastoiditis), resulting from otitis media, a relatively common infection in children, is present in four individuals; three males and one female (Figure 4.42). The other case of possible healed infection occurs in the thumb phalanx of Burial BC-23, a male, who also has active lesions of the left ribs. The healed lesion of the thumb phalanx may represent the sequelae of a soft tissue injury and periosteal contusion.

The estimated frequencies of these infectious lesions in Ban Chiang adults are summarized in Table 4.124. These "per element" frequencies support the uncommon occurrence of these lesions in this skeletal sample. Possible infection of the mastoid process occurs fairly equally in both male (3/34, 8.8%) and female (2/29, 6.9%) temporal bones. While possible infectious lesions of the tibial shaft are twice as common in male tibiae (2/47,4.3%) as in female tibiae (1/48, 2.1%), perhaps attributable to more reckless or physical activity in the males.

The single subadult from Ban Chiang with possible infectious lesions, a newborn, has bilaterally affected femora (2/39, 5.1%) and tibiae (2/24, 8.3%). The lack of periosteal reactive bone or porosity of the skull vault bones is suggestive that these lesions are not related to genetic anemia, but certainly the occurrence of a genetic anemia in this individual, contributing to fetal death cannot be excluded.

Table 4.124. Prevalence of Infection in Ban Chiang Adults

Element/Site	Male				Female				Total	
	Right		Left		Right		Left			
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
Temporal Bone	3/17	17.6	0/17	0.0	1/14	7.1	1/15	6.7	5/63	7.9
Ribs*	0/119	0.0	4/118	3.4	0/111	0.0	0/110	0.0	4/458	0.9
Hand Phalanges	1/281		0.4		0/200		0.0		1/481	0.2
Ilium	1/13	7.7	0/13	0.0	0/10	0.0	1/10	10.0	2/46	4.3
Tibia - Shaft	2/24	8.3	0/23	0.0	1/25	4.0	0/23	0.0	3/95	3.2

Note: A=affected, O=observed, C=cervical, L=lumbar. * Ribs counted by axial ends, includes ribs three through twelve.

Table 4.125. Temporal Distribution of Individuals with Infection from Ban Chiang

Element Affected # of Individuals	Early Group				Late Group					
	EP I	EP II	EP III	EP IV	EP V	MP VI	MP VII	MP VIII	LP IX	LP X
Mastoid				2		1	1			
Ribs					1*					
Hand					1*					
Pelvis				1		1				
Femur				1†						
Tibia				1†	1		1			1

Note: #= number, EP=Early Period, MP=Middle Period, LP=Late Period. * Denotes infections in the same individual. † Indicates a newborn.

None of these documented lesions is pathognomonic for a specific infectious disease such as tuberculosis, or treponematoses. There is a conspicuous absence of lesions suggestive of infection in the early periods at Ban Chiang (Table 4.125), but the relatively thin distribution of the cases over time supports a conclusion of localized etiologies rather than epidemic or endemic disease.

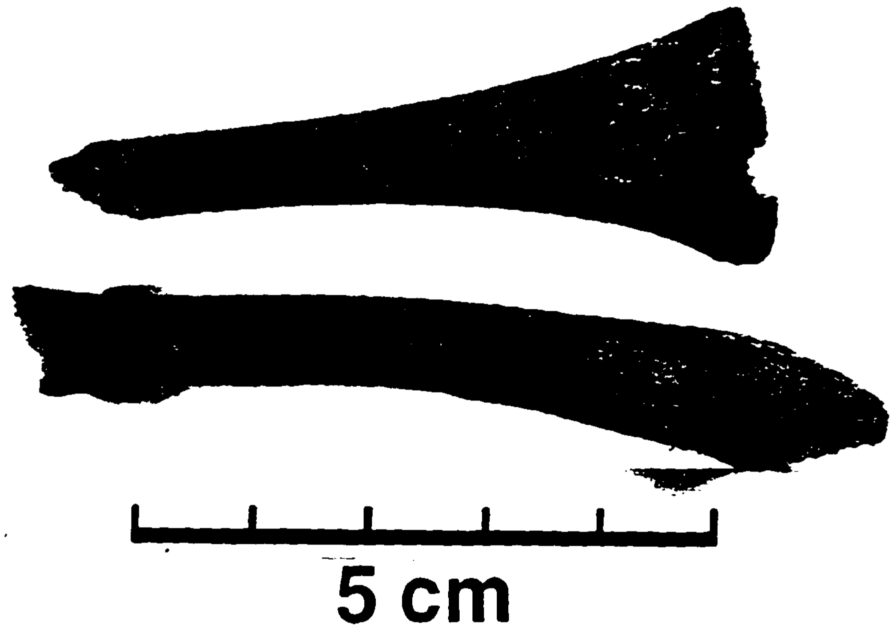


Figure 4.41. Appositional Periostitis of the Femur and Tibia Diaphyses in a Newborn [BCES-43]

Figure 4.42. Lytic Defect of the Suprameatal Triangle

CHAPTER 5: NON NOK THA INDICATORS OF STRESS

This chapter presents the results of analysis of the Non Nok Tha human skeletal series for the indicators of stress discussed above. The two excavation series are treated as a single sample, with recognition of the presence of all of the biases of skeletal collections. Descriptions of each individual burial are presented in Appendix C, and the temporal context and provenience are summarized in Tables B.17 and B.18. In the course of re-examination of the 1966 material, some of the burials could not be reconciled with the excavation notes and/or with Pietrusewsky (1974a), these burials are necessarily excluded from all temporal analyses. In addition, burials assigned an "insecure context" by Parker (in press) or Bayard (1971, Bayard and Solheim in press) are treated as "secure" in this analysis.

PALEODEMOGRAPHY

The combined sample from Non Nok Tha numbers 180 burials, of which 4 are determined to be fetal remains (Table 5.1). There are 76 males, 82 females, and 22 burials of unknown sex. Subadults less than 15 years of age comprise 27% of the population (47/176), those between 15 and 19 years 1.7%, and adults (>20 years) 74% of the sample, suggesting a fairly good subadult representation. Most of the individuals of unknown sex are subadults. More than one-quarter of the entire sample is adults of indeterminate age (n=47), providing great potential for error in demographic reconstruction. The sex ratio at Non Nok Tha, including subadults is 76:82, skewed toward females; in individuals over 15 years of age, however, the ratio is still unequal (60:67).

Table 5.1. Burial Age and Sex Distribution of the 1966 and 1968 Excavations at Non Nok Thailand

Age Category	Male	Female	?Sex	Total
Fetal			4	4
N.B. - 0.9 yrs	3	2	1	6
1 - 1.9	1	4	1	6
2 - 2.9	1	1		2
3 - 3.9	5	2	1	8
4 - 4.9	2	1	1	4
5 - 5.9		1	1	2
6 - 6.9			2	2
7 - 7.9	2	2	2	6
8 - 9.9	1	1		2
10 - 11.9	1		1	2
12 - 14.9		1	1	2
15 - 19.9	1	2		3
20 - 24.9	1	5		6
25 - 29.9	2	5		7
30 - 34.9	4	2		6
35 - 39.9	12	7		19
40 - 44.9	6	10		16
45 - 49.9	8	1		9
≥50	10	8		18
Adult	13	19	4	36
Middle-aged	3	8		11
Subadult			3*	3
TOTAL	76	82	22	180

* One burial is 3-5 years; two burials 0-3 years of age.

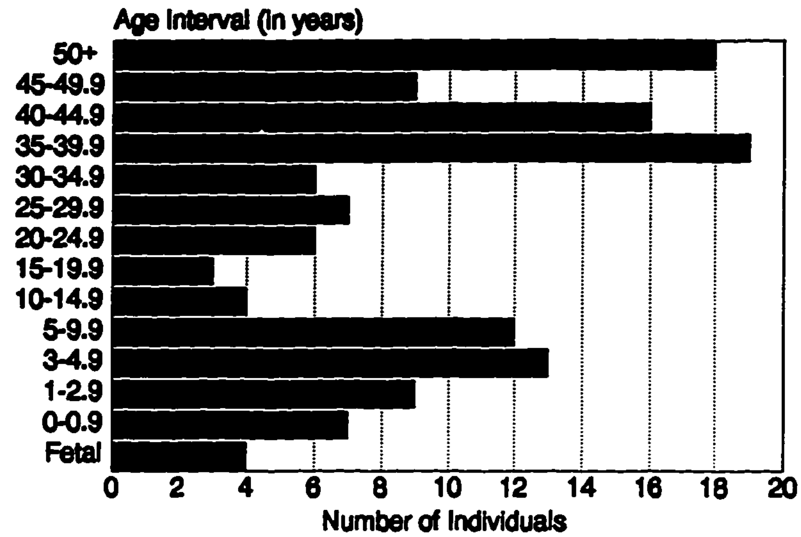


Figure 5.1. Non Nok Tha Age Distribution

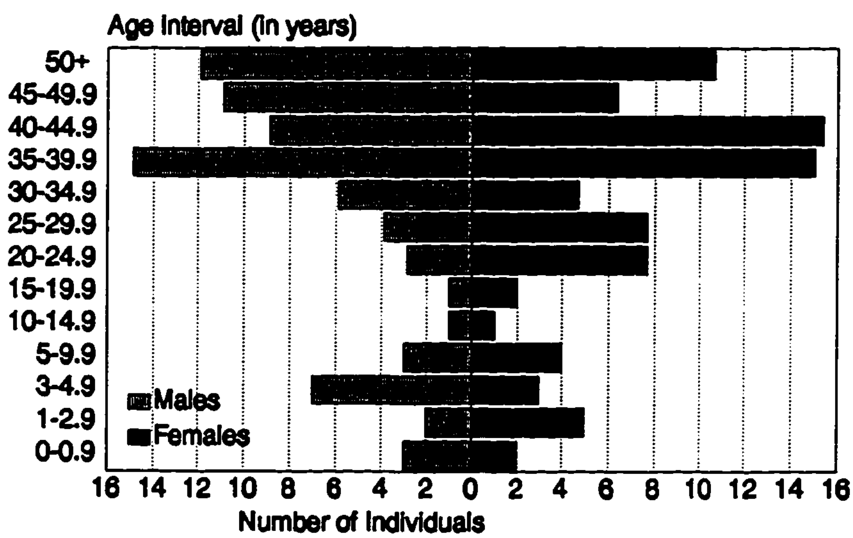


Figure 5.2. Non Nok Tha Age and Sex Distribution

The age distribution at Non Nok Tha (Figure 5.1) documents a high childhood mortality, little adolescent mortality and a gradual rise toward old age. There appears to be adequate subadult representation, and although there are a number of older aged individuals, the peak in deaths at age 35-40 suggests a bias of aging methods. The distribution of sexed burials (Figure 5.2), including an even distribution of the adults of indeterminate age, shows fairly equal representation in childhood. There are more early adulthood deaths in females, and even mortality in the late middle-age intervals. The Non Nok Tha age/sex distribution is restricted in the early age intervals by 19 subadults of undetermined sex.

A traditional abridged life table (Table B.19) generates a life expectancy at birth (e^{o}_{b}), or mean age at death, of 30.85 years. Thus, the birth rate, found by the inverse of the mean age at death is projected to be 3.2 births per 100. An alternate abridged life table (Jackes 1992) which attempts to mitigate errors of adult age estimation and poor representation in subadults (Table 5.2), results in a slightly higher life expectancy at age 5 years.

Table 5.2. Abridged Life Table for Combined Sample from Non Nok Tha, Thailand

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^{o}_{x}
0-4.9	5	29	16.48	100.0	0.1648	458.8	0.0359	3173.3	31.73
5-9.9	5	12	6.82	83.52	0.0816	400.6	0.0170	2714.5	32.50
10-14.9	5	4	2.27	76.70	0.0296	377.8	0.0060	2313.9	30.17
15-19.9	5	3	1.70	74.43	0.0229	367.9	0.0046	1936.1	26.01
20-24.9	5	6	3.41	72.73	0.0469	355.1	0.0096	1568.2	21.56
25-60	35	122	69.32	69.32	1.0000	1213.1	0.0571	1213.1	17.50
Total		176							

Source: After Jackes 1992. Key: x = Age interval in years, n_x = Width of age interval x, D_x = Actual numbers of observed deaths at age x, d_x = Number of individuals dying at age x, based on a cohort of 100, l_x = Survivorship at age x, q_x = Mortality rate or probability of dying at age x, L_x = Number of years lived between age x and x+1, m_x = Age specific death rate for age interval x, T_x = Total number of years lived beyond age x, e^{o}_{x} = Expectation of life at age interval x (life expectancy).

Estimating the fertility at Non Nok Tha using the 20+/5+ Statistic (128/147, 0.871) and the assumptions of stationarity required by the formula results in a birth rate of 27.02. The Juvenile:Adult Ratio (JA) in the combined sample at Non Nok Tha is 0.125 (16/128) and the Mean Childhood Mortality (MCM) is 0.0447. Plotting these values against Jackes data (Figure 5.3), shows that Non Nok Tha falls at the lower end of the line, in the area of a stationary or decreasing populations (Jackes 1992). Estimating fertility based on the MCM, suggests Non Nok Tha fertility as between 3 and 4 children (Jackes 1986:). The fact that the Non Nok Tha sample falls within the scatter plot of historic, archaeological and model life table data points suggests that the skeletal sample is a good representation.

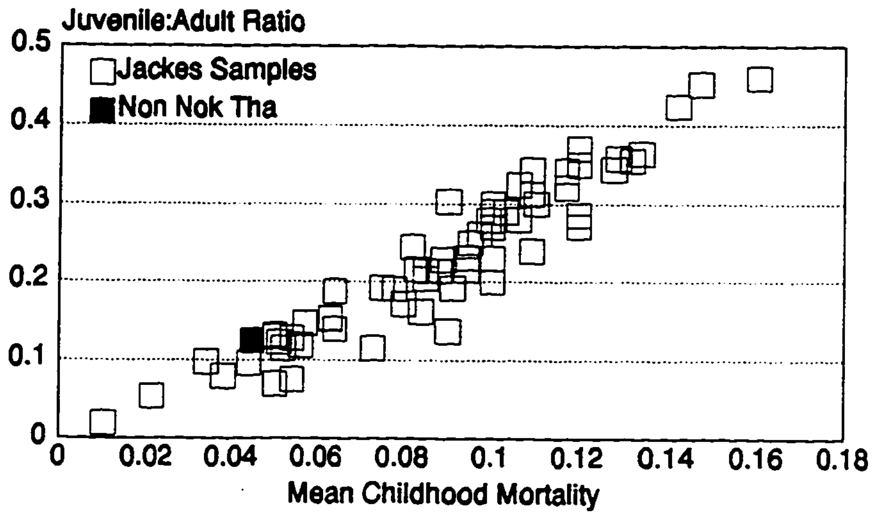


Figure 5.3. Plot of JA:MCM Ratios

Figure 5.4 shows the shape of the juvenile mortality in the Non Nok Tha sample with examples of juvenile mortality from United Nations life tables (Jackes, personal communication). The Non Nok Tha sample illustrates a high early childhood mortality, expected in a population with high fertility, followed by a decline in the juvenile years, and ending with a high adolescent mortality. The Non Nok Tha curve is atypical in that there is higher mortality in the 10-14.9 year age interval than in the 15-19.9 year age interval, suggesting that one of the skeletal sample biases may be present. However, the very small

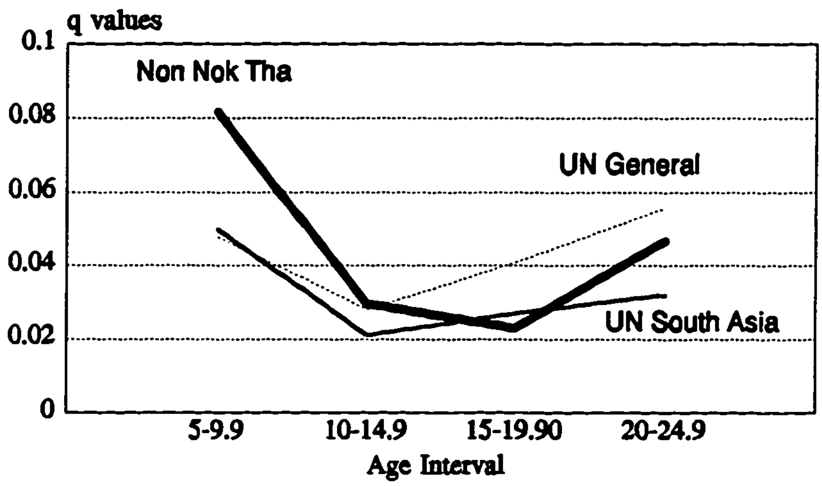


Figure 5.4. Non Nok Tha Juvenile Mortality

sample sizes increases the effect of a single individual placed within an age interval. The difference between the 10-14.9 interval and the 15.19.9 interval is a single burial.

Temporal Change in Paleodemography

The skeletal sample from Non Nok Tha can be separated into two groups: The Early Group includes the Early Period (EP 1-3) and first three Middle Periods (MP 1-3), spanning approximately 3000-2500 B.C. The Late Group includes the remaining Middle Periods (MP 4-8), covering approximately 2500 B.C.-100 A.D., and marking the temporal period of widespread bronze use and the presence of affiliative groups (Bayard and Solheim in press). The age and sex distributions of the phase subsamples are presented in Table B.20.

Early Group

The early sample from Non Nok Tha (EP 1-3, MP1-3) is composed of 83 individuals (Figure 5.5). There are no fetal remains, subadults (<15) represent 37% of the skeletal sample and adults 60%. This distribution fits that of a cemetery population. The overall sex ratio is skewed towards females (34:41); similar skewing is present in adults (23:28). There appears

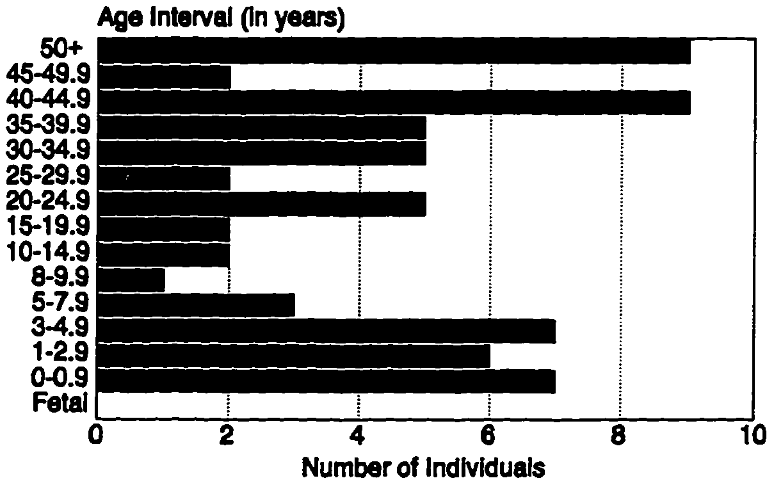


Figure 5.5. Age Distribution of Early Group Burials

to be high early childhood mortality, followed by an unusual peak in the 20-24.9 year age interval; again, an erratic distribution likely results because of the aging methods.

The sex distribution of the burials at Non Nok Tha, with adults of indeterminate age evenly distributed, shows a greater number of females in the population overall (Figure 5.6). While the male age distribution approaches a smooth curve, the female distribution is quite erratic. Most of the early adult deaths are in females. These are most likely to be deaths related to childbearing, and again reflect an absence of the young adult males expected in communities engaged in warfare.

An abridged life table, following Jackes (1992), documents high early childhood mortality (Table 5.3). Paleodemographic estimators for this early sample at Non Nok Tha, include a JA of 0.115, MCM 0.0465,and 20+/5+ statistic of 0.867.

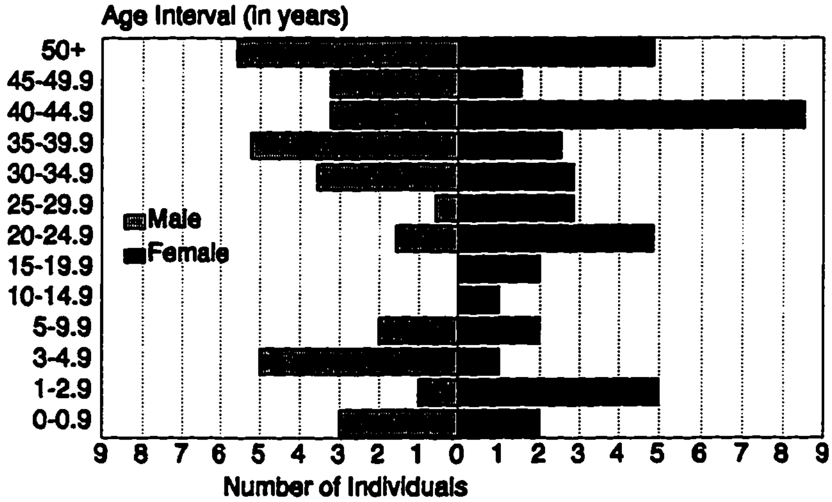


Figure 5.6. Sex and Age Distribution of Early Group Burials

Table 5.3. Abridged Life Table for the Early Group (EP 1-3, MP 1-3) from Non Nok Tha, Thailand

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-4.9	5	23	27.71	100.0	0.2771	430.72	0.0643	2719.9	27.20
5-9.9	5	4	4.82	72.29	0.0667	349.40	0.0138	2289.2	31.67
10-14.9	5	2	2.41	67.47	0.0357	331.33	0.0073	1939.8	28.75
15-19.9	5	2	2.41	65.06	0.0370	319.28	0.0075	1608.4	24.72
20-24.9	5	5	6.02	62.65	0.0962	298.19	0.0202	1289.2	20.58
25-60	35	47	56.63	56.63	1.000	990.96	0.0571	991.0	17.50
Total		83							

Note: See Table 5.2 for explanation of variables.

Plotting these values on the Jackes model, historical and archaeological sample plot, shows the Early Group Non Nok Tha sample falling in the lower region of the distribution, where decreasing or stationary populations are found (See Figure 5.9).

Late Group

The Late Group from Non Nok Tha, Middle Periods 4-8, is composed of 83 individuals including three sets of fetal remains. There are 13 subadults less than 15 years (13/83, 15.7%), and 69 adults (83.1%). Again, as with the other samples discussed here, a large portion of the adult sample is of indeterminate age (28/69, 40.6%). Sex could not be estimated in nine individuals, mostly subadults. The sex ratio is fairly even (35:38). The age distribution (Figure 5.7) shows the expected peak in early adulthood which is attributed to bias in the aging methods. There are few infant and early childhood deaths in this sample, which may be related to differential burial practices which were seen in the 1966 cluster of infant burials.

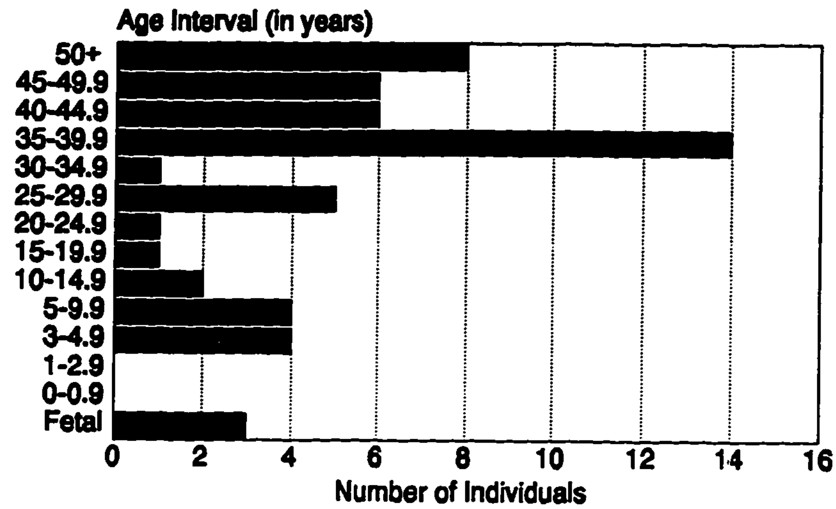


Figure 5.7. Age Distribution of the Late Group Burials

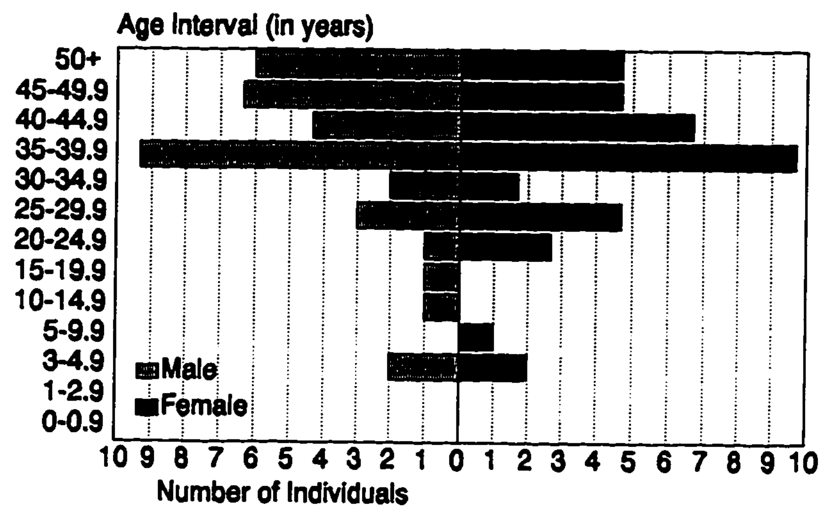


Figure 5.8. Age and Sex Distribution of Late Group Burials

The sex distribution of the later Non Nok Tha sample, with adults of indeterminate age evenly distributed, reveals a fairly even distribution through all the age intervals (Figure 5.8).

The abridged life table for the late sample at Non Nok Tha (Table 5.4) enables calculation of the various estimators which are independent of the age estimation methods in adults. The 20+/5+ statistic in this sample is 0.908, the JA ratio (6/69) is 0.087, and the MCM is 0.032. Plotting the late sample on the Jackes data as above, again suggests there is little bias in the sample since it falls close to the middle of the distribution (Figure 5.9).

Table 5.4. Abridged Life Table for Late Group (MP 4-8) from Non Nok Tha, Thailand

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e°_x
0-4.9	5	4	5.00	100.00	0.500	487.50	0.0103	3743.8	37.44
5-9.9	5	4	5.00	95.00	0.0526	462.50	0.0108	3256.3	34.28
10-14.9	5	2	2.50	90.00	0.0278	443.75	0.0056	2793.8	31.04
15-19.9	5	1	1.25	87.50	0.0143	434.38	0.0029	2350.0	26.86
20-24.9	5	1	1.25	86.25	0.0145	428.13	0.0029	1915.6	22.21
25-60	35	68	85.0	85.00	1.000	1487.5	0.571	1487.5	17.50
Total		80							

Note: After Jackes 1992. See Table 5.2 for key.

Comparing the demographic estimators of these two temporal samples from Non Nok Tha, with the caveat of probable bias in the mortuary sample because of differential use of the mound, shows some interesting differences (Table 5.5). There is declining fertility in the Late Group at Non Nok Tha, with a decline in childhood mortality, and a decreasing juvenile mortality. The increase in the 20+/5+ ratio, representing the inverse of the birth rate, also suggests a declining fertility.

Table 5.5. Paleodemographic Estimators in Non Nok Tha Skeletal Remains

Sample	N	MCM*	JA*	20+/5+†	Fertility‡
Combined	180	0.0447	0.125	0.871	3-4
Early (EP1-3, MP1-3)	83	0.0465	0.115	0.867	4
Late (MP 4-8)	83	0.032	0.087	0.908	3

* Jackes 1992. † Konigsberg et al. 1989. ‡ Jackes 1994.

These temporal changes are graphically represented in Figure 5.9, again showing that the Non Nok Tha sample falls close to the center of the distribution suggesting it is relatively unbiased. The shift in orientation toward the left end of the distribution suggests declining fertility, a decline in childhood mortality as well as a decreasing juvenile mortality in the Late Group. Both of the samples remain in the region of stationary or slightly declining populations.

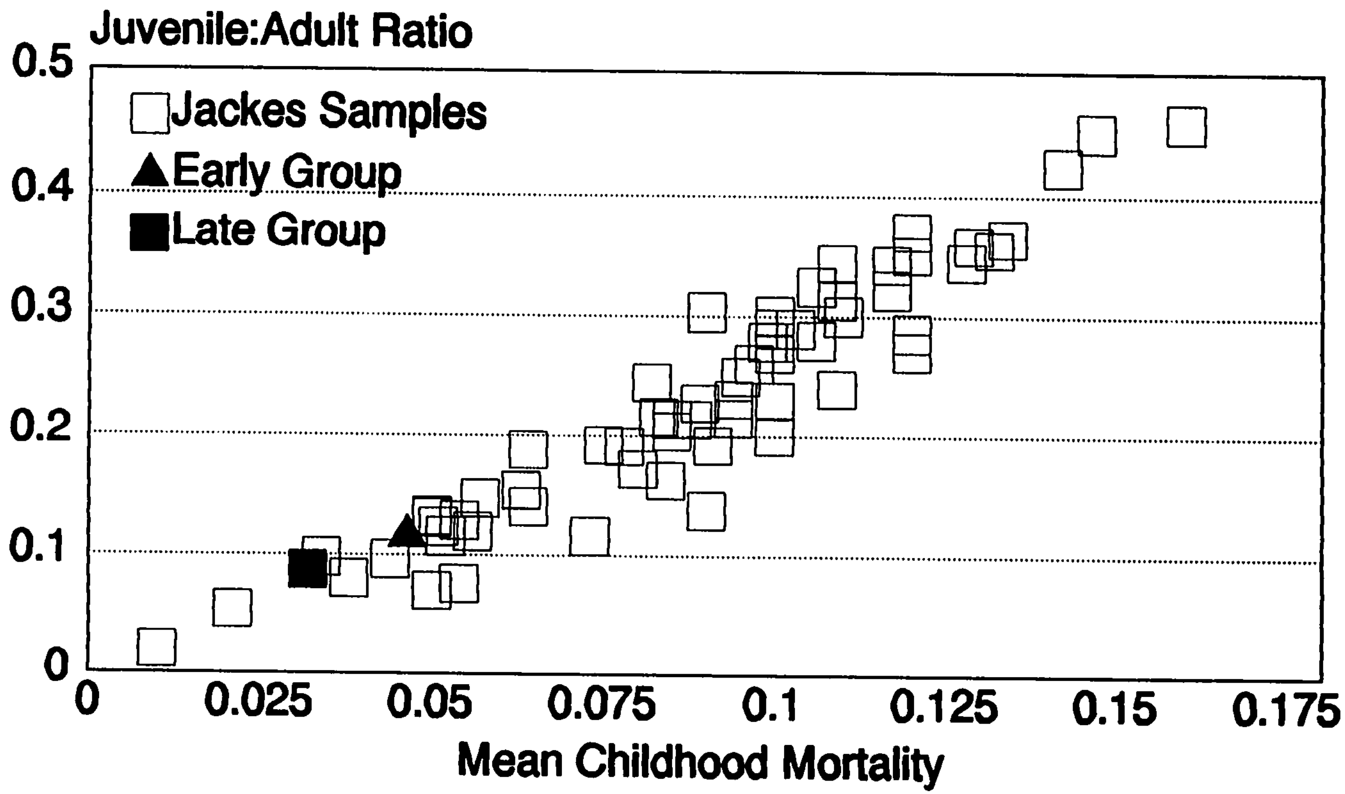


Figure 5.9. JA:MCM Plot of Non Nok Tha Group Samples

GROWTH

Subadult Diaphyseal Length

Contrasting the measurements of diaphyseal length and estimation of age-at-death by dental eruption and/or calcification is possible in 20 subadults from Non Nok Tha (See Tables A.7 and A.8). The most numerous diaphysis was that of the humerus (n=14), followed by the femur (n=13) and the tibia (n=8). Unfortunately, only two subadults had measurements of all three of the major long limb diaphyses. Plotting the humeral diaphyseal length against the estimated age-at-death based on dental criteria only, Figure 5.10, reveals a uniform distribution

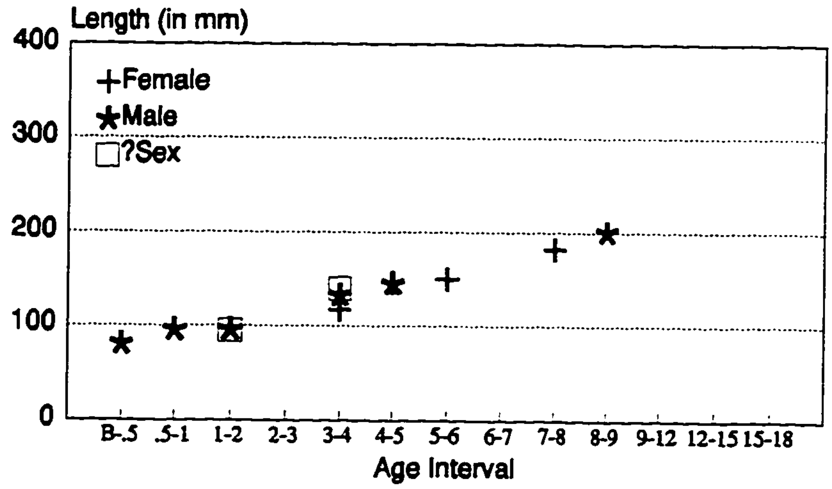


Figure 5.10. Humeral Diaphyseal Length vs Dental Age

of increasing diaphyseal lengths per age. There are no apparent differences between the male and female subadults at Non Nok Tha. The distribution achieves a nearly linear increase in diaphyseal length over time.

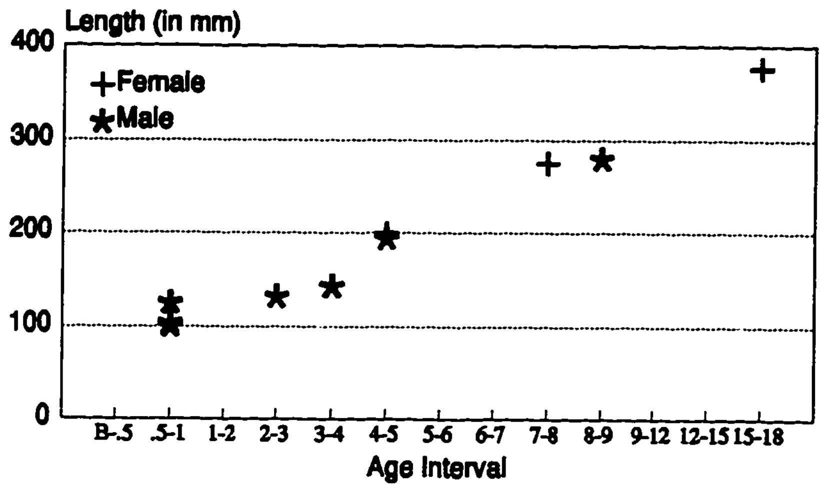


Figure 5.11. Femoral Diaphyseal Length vs Dental Age

The femoral diaphyseal lengths, plotted against dental age estimates, substantiate the lack of differences between male and female subadults at Non Nok Tha (Figure 5.11). The femoral distribution is not as linear as that of the humeral diaphysis, exhibiting a slowing at age 1-4 years, and then a rapid incline after age five years.

Finally, the tibial diaphyses, present in eight individuals, are plotted in Figure 5.12. The small size of this sample severely restricts the interpretation of this distribution. Again, the clustering of the ?male and ?female observations is suggestive of the absence of sex differences in the Non Nok Tha sample. No interpretation of the trajectory of the curve is

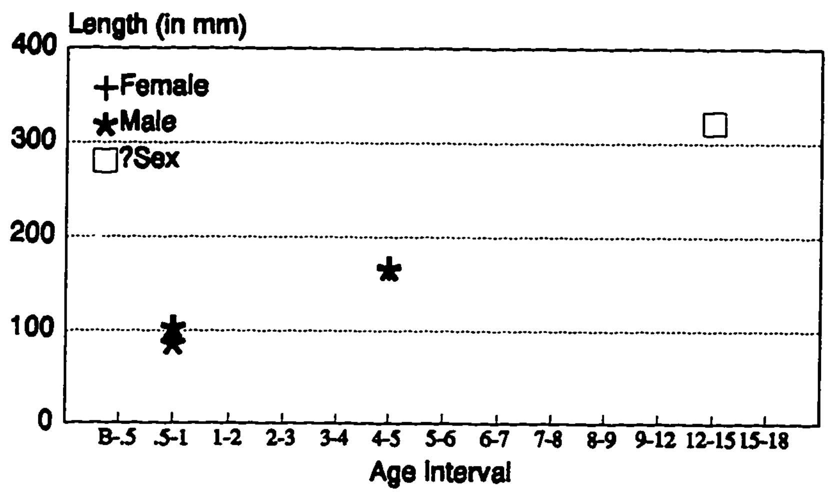


Figure 5.12. Tibial Diaphyseal Length vs Dental Age

possible with this limited sample.

In the absence of apparent sex differences in the distribution of the humeral, femoral and tibial diaphyseal lengths relative to dental age estimates, examination of change over time may combine the samples. Comparing the lengths of the most common diaphysis, the humerus, by time period (Figure 5.13) reveals the sample is skewed toward the Early Group, and no apparent change in humeral diaphyseal length over time can be seen.

The sample sizes of femoral and tibial diaphyseal lengths are also skewed with Early Group individuals and are not large enough to exhibit overlapping distributions. While the conclusions of this exercise must be tentative, there is the suggestion of an absence of obvious differences in growth timing between presumed male and female subadults, and well as a failure to demonstrate an obvious difference in the temporal periods.

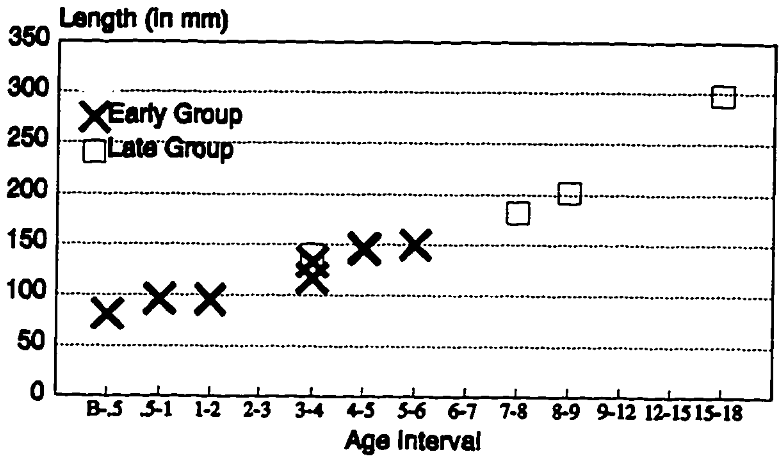


Table 5.13. Temporal Comparison of Humeral Diaphyseal Lengths

Adult Stature and Long Bone Length

Stature estimates in the Non Nok Tha adults are summarized in Tables B.21 and B.22. Three different formulae were applied to the available long limb bone length measurements, but the Thai-Chinese and non-ethnic formulae are the most applicable methods. In males, statures are estimated from the femur (16), humerus (6), forearm (5), tibia (3) and fibula (2). In females, statures are estimated from the femur (13), humerus (6), fibula (6), forearm (5) and tibia (2). To facilitate comparisons, although discouraged by Trotter (1958), mean stature estimates are calculated for the males and females from Non Nok Tha (Table 5.6). Although the mean statures vary little by formulae, the Thai-Chinese method has a narrower range and smaller standard deviation.

Table 5.6. Mean Stature Estimates (in cm) in Non Nok Tha Adults

Formulae*	Male				Female			
	n	Mean	SD	Range	n	Mean	SD	Range
Non-ethnic	32	164.8	5.3	154-178	32	154.3	6.5	140-164
Thai-Chinese	32	165.4	3.5	158-173	32	153.4	4.0	146-162

* Non-ethnic formulae (Sjøvold 1990), Thai-Chinese formulae (Sangvichien *et al.* 1985, nd). SD=standard deviation, n=number.

Comparing the mean stature estimates over time (Table 5.7) suggests there is an increase in mean stature in the Late Group in both males (1.3-3 cm) and females (3-4 cm). Using the non-ethnic formulae, there is a significant increase in mean stature in the males (t=1.6154, df=30); while in the females (t=1.6803, df=29) the mean stature increase approaches statistical significance (α=0.10). The Thai-Chinese stature estimates show a statistically significant increase in female mean stature over time (t=2.1986, df=29), but none in the males. Thus, the suggestion of an increase in stature over time is apparent.

Table 5.7. Mean Stature Estimates (in cm) in Non Nok Tha Adults (By Group)

Formulae*	Group	Male†				Female			
		n	Mean	SD	Test	n	Mean	SD	
Non-ethnic	Early	**15**	**163.2**	**3.5**	***t*=-2.2043 *p*=0.0356**	16	152.6	7.6	*t*=-1.6803 *p*=0.1036
	Late	**16**	**167.0**	**5.6**		15	156.4	4.7	
Thai-Chinese	Early	15	164.7	2.4	*t*=-1.5633 *p*=0.1288	**16**	**152.0**	**3.9**	***t*=-2.1986 *p*=0.0360**
	Late	17	166.5	3.8		**15**	**155.0**	**3.7**	

* Non-ethnic formulae (Sjøvold 1990), Thai-Chinese formulae (Sangvichien et al. 1985, nd). † Late Group male Burial 2-56 [humerus length 153.9 mm] removed from sample to lower S.D./variance to meet equal variance assumption. SD=standard deviation, n=number. **Bold** indicates statistical significance (α=0.10).

Examining the Non Nok Tha adult individual femoral and tibial lengths may help to elucidate this apparent change in stature over time (Table 5.8). Measurement of the element from the left side is chosen if both bones are present, and the right side is used in the

Table 5.8. Tibiae and Femora Available for Measurement in Non Nok Tha Adults

Period	Males			Females		
	Femora	Tibiae	Individuals	Femora	Tibiae	Individuals
E1	1	1	1	1	2	2
E2				1	1	1
E3	2		2	1	1	1
M1	2	1	2		2	2
M2	2	2	2	1	1	1
M3	2	2	2	1		1
M4	2	4	4	1	2	2
M5	3	3	3	3	2	3
M6	2	2	3	2		2
M7				1		1
M8				1	1	2
Total	16	15	19	13	12	17

absence of the left. The available whole bones (no estimated lengths from segment measurements) represent 19 males and 17 females. The females are more evenly distributed over the temporal periods than the males.

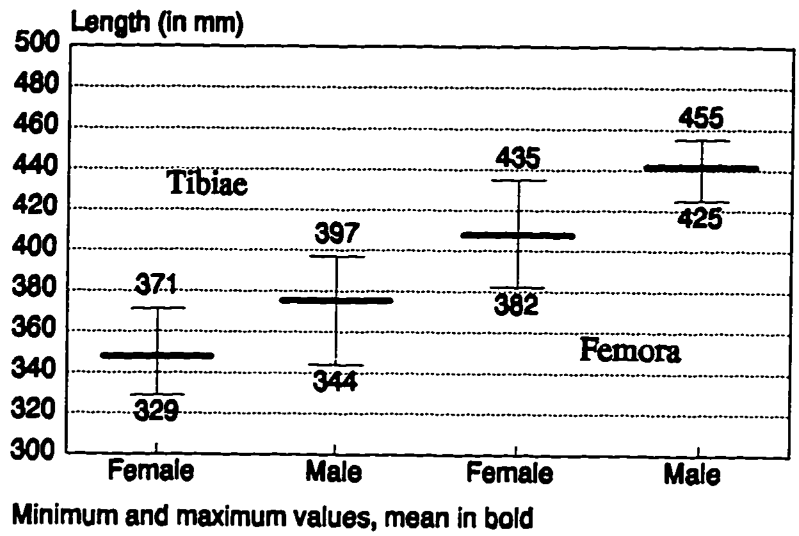


Figure 5.14. Femoral and Tibial Lengths in Non Nok Tha Adults

Using the combined sample, and examining the means and ranges of the bone lengths, it is apparent that although the means are well separated by sex, there is generous overlapping in the ranges of bone lengths (Figure 5.14). This suggests that femoral and tibial bone lengths as sex discriminators should be applied with caution in this population. Generally, the means appear in the approximate center of the distribution, suggesting there are few outliers.

Temporal Change in Long Bone Length

Dividing the Non Nok Tha sample of femoral and tibial lengths into early and late phases of the site, will enable observations of a possible increase in length over time (Figure 5.15). In the females, there is a narrowing of the range of femur length, and increase in the

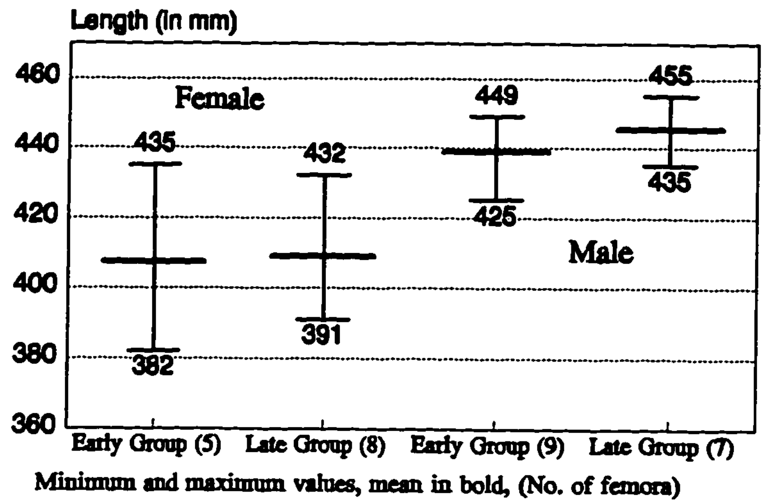
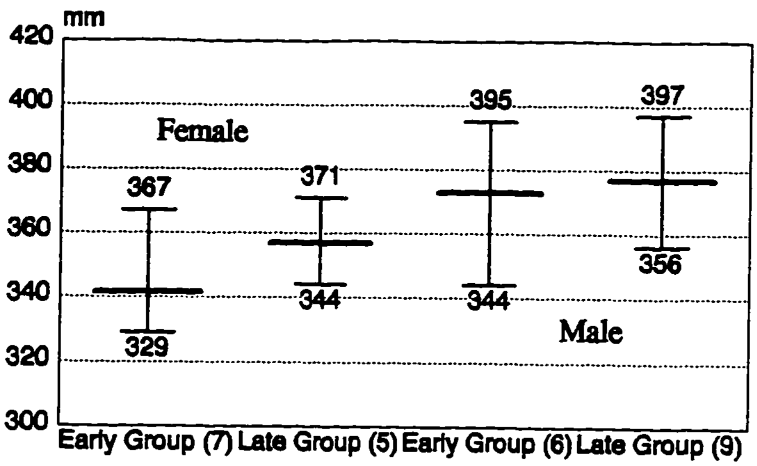


Figure 5.15. Temporal Change in Femoral Length

minimum femur length, but no apparent change in the mean length between the Early Group (407.4 mm) and the Late Group (409.9 mm) [t=-0.2488, p=0.8081]. In the males, again, the range narrows in the Late Group, but here there is a 6.6 mm difference between the means (438.8:445.4). *Student's t* test of the means, however, is not statistically significant (t=1.6147, p=0.1287).

Measurement of the length of the tibia in both males and females reflects an apparent increase in length over time (Figure 5.16). In the females, the mean length of the Early Group sample (341.3 mm) is at the lower end of the range of lengths, suggesting that the maximum length may be an outlier. There is a fairly large increase in the mean tibial length in the Late Group females (356.8 mm), a difference statistically significant (t=-2.2093, p=0.0516). In the males, a decrease in the range of tibia lengths is also apparent, but there is little change in the means (372.7 mm : 376.7 mm) [t=-0.4692, p=0.6467].

In summary, there is an increase in mean stature in both males and females at Non Nok Tha over time (the latter is statistically significant). There is also an apparent secular



Minimum and maximum levels, mean in bold, (No. of tibiae)

Figure 5.16. Non Nok Tha Tibial Lengths Over Time

increase in the lengths of the femur and tibia in Non Nok Tha adults, although only the female mean tibial length increases significantly. Otherwise, there are no significant differences between the two phases.

DENTAL ENAMEL HYPOPLASIA

Hypoplasia was scored in the permanent teeth, by tooth, using a six level coding system for type: 0=absent, 1=horizontal line (LEH) [Figure 5.17], 2=linear vertical groove, 3=linear horizontal pits, 4=non-linear pits, 5=single pit, 6=hypocalcification. Because the exact meaning, etiology, and function of hypocalcification defects are not known, the focus of this discussion will be on the other types of hypoplasia, and all frequencies of hypoplasia will not include hypocalcification counts. Summaries of the hypoplasia in the permanent teeth of individuals less than 15 years of age (Table B.23), and those over 15 years of age (Table B.24) are available in Appendix B.

In permanent teeth of individuals less than 15 years of age (Table 5.9), other than a single observation of hypocalcification, LEH defects predominate (14.5%, 10/69). There are more defects in the maxillary teeth (23.5%, 8/34) than the mandibular teeth (5.7%, 2/35), and the incisors (21.7%) are most often affected. These defects occur in three individuals (two males and one female).

Table 5.9. Hypoplasia in Non Nok Tha Subadult (<15 Years) Permanent Teeth

Sex A/O	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	2/6	1/1	1/2	3/7	7/16	0/5	0/1	0/2	2/3	2/10	9/27
Female	1/5	0/2	0/1	0/4	1/12	0/8	0/1	0/2	0/4	0/17	1/29
? Sex	0/2		0/2	0/2	0/6	0/5		0/1	0/1	0/7	0/13
Total	3/13	1/3	1/5	3/13	8/34	0/18	0/2	0/5	2/5	2/35	10/69

Note: 13 individual burials (5 males, 5 females, 3 ?sex) are represented. Hypocalcification is counted as absent. M=molar, P=premolar, C=canine, I=incisor, A=affected, O=observed.

Dental enamel hypoplasia (omitting hypocalcification), is uncommon in the Non Nok Tha permanent teeth (individuals >15 years of age), occurring in only 7.9% (87/1095) of the teeth observed. The linear enamel hypoplasia (LEH) is the most common variety (4.7%, 52/1095), followed by non-linear pits (2.8%, 31/1095). Pitting hypoplasia (3.0%, 33/1095), primarily non-linear, is found predominately in the canine teeth of both jaws. Vertical grooves are extremely rare in these teeth (0.2%). Hypoplasias are more common in the maxillary teeth (9.1%, 49/537) than in the mandibular teeth (6.8%, 38/558), and are noted more often in the canines (22.8%, 33/145) and incisors (8.6%, 15/174), than the molars (5.0%, 23/460) and premolars (5.0%, 16/320).

The prevalence of all hypoplasias (omitting hypocalcification) in male teeth is 10.3% (54/526) and in female teeth 5.8% (33/57), a difference which is statistically significant (Table 5.10). None of the mandibular teeth exhibit significant gender differences in frequency, but the maxillary second molar, fourth premolar, and lateral incisor frequencies are significantly greater in male teeth, while hypoplasias of the lateral incisors are greater in female teeth.

Figure 5.17. Linear Enamel Hypoplasia of the Maxillary Third Molar

Table 5.10. Prevalence of All Hypoplasias, By Sex, in Non Nok Tha (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla M3	2/22	9.1	0/23	0.0	FET	0.233
M2	**8/42**	**19.1**	**0/44**	**0.0**	**FET**	**0.002**
M1	2/38	5.3	1/51	2.0	FET	0.573
P4	**5/39**	**12.8**	**0/45**	**0.0**	**FET**	**0.019**
P3	3/37	8.1	2/42	4.8	FET	0.661
C	8/32	25.0	6/33	18.2	χ^2=0.447	0.504
I2	1/22	4.5	6/24	25.0	**FET**	**0.098**
I1	3/20	15.0	2/25	8.0	FET	0.642
Total Maxillary Hypoplasia	**32/252**	**12.7**	**17/287**	**5.9**	**χ^2=7.453**	**0.006**
Mandible M3	2/35	5.7	0/34	0.0	FET	0.493
M2	2/43	4.7	1/41	2.4	FET	1.000
M1	4/40	10.0	1/47	2.1	FET	0.176
P4	2/41	4.9	0/40	0.0	FET	0.494
P3	2/40	5.0	2/36	5.6	FET	1.000
C	8/40	20.0	11/40	27.5	χ^2=0.621	0.431
I2	1/20	5.0	1/27	3.7	FET	1.000
I1	1/15	6.7	0/21	0.0	FET	0.417
Total Mandibular Hypoplasia	22/274	8.0	16/286	5.6	χ^2=1.312	0.252
Total Hypoplasia	**54/526**	**10.3**	**33/573**	**5.8**	**χ^2=7.642**	**0.006**

Note: Hypocalcification defects are omitted. A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 77 individuals: 37 males, 40 females; 73 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Examining the distribution of hypoplasias, by type (Table 5.11), documents a slight sex difference. Male teeth (5.3%, 28/526) have more LEH than female teeth (4.2%, 24/573), as well as more pitting defects (4.9% : 1.2%). This trend is reproduced in both the maxillary and mandibular teeth. The male canine teeth have the largest number of pitting defects (15/72, 20.8%).

Table 5.11. Distribution of Hypoplasias in Non Nok Tha Permanent Teeth (>15 years) By Type

Tooth Class/ Hypoplasia Type	Maxilla				Mandible			
	Male		Female		Male		Female	
	A/O	%	A/O	%	A/O	%	A/O	%
Molars LEH	10/102	9.8	1/118	0.8	2/118	1.7	2/122	1.6
Pitting defects	2/102	2.0	0/118	0.0	6/118	5.1	0/122	0.0
Premolars LEH	7/76	9.2	2/87	2.3	2/81	2.5	2/76	2.6
Pitting defects	1/76	1.3	0/87	0.0	2/81	2.5	0/76	0.0
Canines LEH	0/32	0.0	5/33	15.2	1/40	2.5	4/40	10.0
Pitting defects	8/32	25.0	1/33	3.0	7/40	17.5	5/40	12.5
Incisors LEH	4/42	9.5	7/49	14.3	2/35	5.7	1/48	2.1
Pitting defects	0/42	0.0	1/49	2.0	0/35	0.0	0/48	0.0
Total LEH	21/252	8.3	15/287	5.2	7/274	2.6	9/286	3.1
Pitting defects	11/252	4.4	2/287	0.7	15/274	5.5	5/286	1.7

Note: Hypocalcification and vertical grooving are not included. Pitting includes non-linear pits, linear pits and single pits, A=affected, O=observed.

Linear Enamel Hypoplasia

Although there are significant sex differences in the prevalence of all types of hypoplasia (See Table 5.11), when LEH is isolated (Table 5.12) there are fewer significant sex differences. In the maxillary teeth, the prevalence of LEH in the male molars (9.8%) and premolars (9.2%) is significantly greater than that in the female respective teeth (0.8%, 2.3%).

But in the maxillary canines and incisors, female teeth (15.2%, 14.3% respectively) are affected over male teeth (0.0%, 9.5%). The mandibular tooth classes are also erratic in hypoplasia distribution, but there are no statistically significant sex differences. Overall, male teeth (5.3%) have slightly more LEH than female teeth (4.2%).

Table 5.12. Prevalence of LEH, By Sex, in Non Nok Tha (>15 years) Permanent Teeth

Jaw/Tooth		Male		Female		Statistic	
		A/O	%	A/O	%	Test	Probability
Maxilla	Molars	**10/102**	**9.8**	**1/118**	**0.8**	**χ^2=9.239**	**0.002**
	Premolars	**7/76**	**9.2**	**2/87**	**2.3**	**FET**	**0.083**
	Canines	**0/32**	**0.0**	**5/33**	**15.2**	**FET**	**0.053**
	Incisors	4/42	9.5	7/49	14.3	χ^2=0.483	0.487
Total Maxillary LEH		21/252	8.3	15/287	5.2	χ^2=2.078	0.149
Mandible	Molars	2/118	1.7	2/122	1.6	FET	1.000
	Premolars	2/81	2.5	2/76	2.6	FET	1.000
	Canines	1/40	2.5	4/40	10.0	FET	0.359
	Incisors	2/35	5.7	1/48	2.1	FET	0.570
Total Mandibular LEH		7/274	2.6	9/286	3.1	χ^2=0.177	0.674
Total LEH		28/526	5.3	24/573	4.2	χ^2=0.783	0.376

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 77 individuals: 37 males, 40 females; 73 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Pitting Defects

Isolating the predominately non-linear pitting defects in adult permanent teeth (Table 5.13), shows an overall low frequency (3.0%, 33/1099). There is a significant sex difference, with pitting defects more common in male teeth (4.9%) than female teeth (1.2%). These defects are also most likely to occur on the canine teeth of both jaws. Since there are

Table 5.13. Prevalence of Hypoplastic Pitting, By Sex, in Non Nok Tha (>15 years) Permanent Teeth

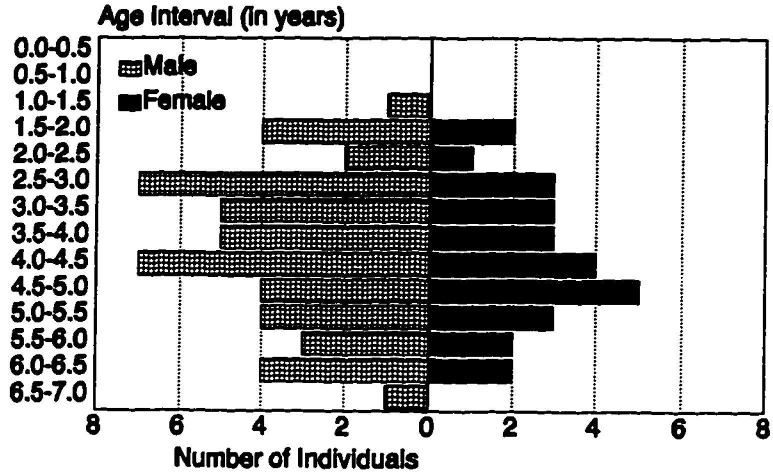
Jaw/Tooth		Male		Female		Statistic	
		A/O	%	A/O	%	Test	Probability
Maxilla	Molars	2/102	2.0	0/118	0.0	FET	0.214
	Premolars	1/76	1.3	0/87	0.0	FET	0.466
	Canines	**8/32**	**25.0**	**1/33**	**3.0**	**FET**	**0.013**
	Incisors	0/42	0.0	1/49	2.0	FET	1.000
Total Maxillary Pitting		**11/252**	**4.4**	**2/287**	**0.7**	**χ^2=7.671**	**0.006**
Mandible	Molars	**6/118**	**5.1**	**0/122**	**0.0**	**FET**	**0.013**
	Premolars	2/81	2.5	0/76	0.0	FET	0.497
	Canines	7/40	17.5	5/40	12.5	χ^2=0.392	0.531
	Incisors	0/35	0.0	0/48	0.0		
Total Mandibular Pitting		**15/274**	**5.5**	**5/286**	**1.7**	**χ^2=5.642**	**0.018**
Total Pitting		**26/526**	**4.9**	**7/573**	**1.2**	**χ^2=13.040**	**0.000**

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 77 individuals: 37 males, 40 females; 73 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

no sex differences in the occurrence of linear defects, it is likely that the sex differences noted in the summary hypoplasia data are the result of the prevalence of pitting defects.

Age-At-Occurrence of Dental Hypoplasia

Measurement of the distance of the dental enamel hypoplasia from the cemento-enamel junction compared to standards of dental development, allows an estimation of the age at which the defect was acquired. Measurements made in 20 individuals are summarized in Table B.25 including both adults and subadult permanent teeth. The majority of these individuals have more than one tooth affected (16/20, 80.0%), while one individual female (Burial 1-63) has a hypoplastic defect of nearly every tooth. Comparing the age-at-occurrence distributions of hypoplasia by sex (Figure 5.18) shows a peak occurrence in males



Note: Includes all teeth

Figure 5.18. Hypoplasias in Non Nok Tha Permanent Teeth

at age 2.5-3.0 years and 4.0-4.5 years. In females, the peak is slightly later, 4.5-5.0 years. Using only the canine teeth, the mean age-at-occurrence in Non Nok Tha males is 4.17 years (SD=0.39) and in females, 4.66 years (SD=0.58). This difference is statistically significant (t=2.4069, df=23, α=0.10).

In summary, hypoplasias of all types are noted in 7.9% of permanent teeth in adults (>15 years of age), while 15.4% of the permanent teeth in individuals less than 15 years of age are affected. Hypoplasias are more common in the maxillary teeth than the mandibular teeth, and are more common in the canines and incisors than the posterior teeth. Male teeth have more hypoplasias (10.3%) than female teeth (5.8%), a statistically significant difference, and a pattern reflected in both the maxilla and the mandible. However, when LEH, the most common variety of hypoplastic defect, is isolated, no significant sex differences are found (male 5.3%, female 4.2%). Examining the occurrence of pitting defects (found only in adult teeth) does reflect significant sex differences, with these defects more common in male teeth (4.9%) than female teeth (1.2%).

Table 5.14. Prevalence of LEH, By Sex and Group in Permanent Teeth (>15 years) at Non Nok Tha

(# of Individuals) Affected/Observed teeth Jaw/Tooth	Early Group (EP 1 - 3, MP 1 - 3)						Late Group (MP 4 - 8)					
	Male (16)		Female (20)		Statistic		Male (19)		Female (18)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla Molars	**9/49**	**18.4**	**1/73**	**1.4**	**FET**	**0.001**	1/51	2.0	0/42	0.0	FET	1.000
Premolars	5/36	13.9	2/49	4.1	FET	0.128	2/38	5.3	0/35	0.0	FET	0.494
Canine	0/16	0.0	4/21	19.0	FET	0.118	0/16	0.0	1/11	9.1	FET	0.407
Incisors	3/15	20.0	7/28	25.0	FET	1.000	1/27	3.7	0/20	0.0	FET	1.000
Total Maxillary LEH	17/116	14.7	14/171	8.2	FET	0.120	4/132	3.0	1/108	0.9	FET	0.382
Mandible Molars	2/63	3.2	1/72	1.4	FET	0.598	0/49	0.0	1/50	2.0	FET	1.000
Premolars	2/44	4.5	2/44	4.5	FET	1.000	0/33	0.0	0/32	0.0		
Canines	0/22	0.0	3/24	12.5	FET	0.235	1/16	6.3	1/16	6.3	FET	1.000
Incisors	0/12	0.0	1/22	4.5	FET	1.000	2/21	9.5	0/26	0.0	FET	0.194
Total Mandibular LEH	4/141	2.8	7/162	4.3	χ^2=0.475	0.491	3/119	2.5	2/124	1.6	FET	0.679
Total LEH	21/257	8.2	21/333	6.3	χ^2=0.763	0.382	7/251	2.8	3/232	1.3	FET	0.342

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10).

Hypoplasia Temporal Comparisons

Although there are no significant sex differences in LEH prevalence in the Non Nok Tha sample, since there were differences in sex prevalence of all hypoplasias, it is wise to examine the phase sub-samples for sex differences (Table 5.14). In the Early Group at Non Nok Tha, male teeth have more LEH than female teeth in the maxilla (14.7% : 8.2%) and overall (8.2% : 6.3%); but not in the mandible (2.8% : 4.3%). In both jaws, there are more defects in the posterior teeth in males while the anterior teeth in females are more commonly affected. The only statistically significant sex difference is noted in the maxillary molars (bold cells).

In the Late Group at Non Nok Tha, again, male teeth have more LEH than female teeth, but the difference extends from the maxilla (3.0% : 0.9%), to the mandible (2.5% : 1.6%) and overall (2.8% : 1.3%). The distribution of LEH over the tooth classes is less differentiated than in the Early Group. None of the sex differences in the Late Group is statistically significant.

Table 5.15. Summary of LEH Prevalence by Sex and Group in Adult Non Nok Tha Permanent Teeth

Teeth		Early (EP, MP 1-3)		Late (MP 4-8)		Statistic	
		A/O	%	A/O	%	Test	p
Male	Maxilla	**17/116**	**14.7**	**4/132**	**3.0**	**χ^2=10.76**	**0.001**
	Mandible	4/141	2.8	3/119	2.5	FET	1.000
	Total	**21/257**	**8.2**	**7/251**	**2.8**	**χ^2=7.063**	**0.008**
Female	Maxilla	**14/171**	**8.2**	**1/108**	**0.9**	**χ^2=6.860**	**0.009**
	Mandible	7/162	4.3	2/124	1.6	FET	0.308
	Total	**21/333**	**6.3**	**3/232**	**1.3**	**χ^2=8.449**	**0.004**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 83 individuals: 40 males, 43 females; 42 Early Group, 41 Late Group. **Bold** indicates statistical significance (α=0.10).

There is a great decrease in the prevalence of LEH between the Early Group and Late Group in both sexes. Testing this difference in the adult teeth from Non Nok Tha (Table 5.15), reveals a significant decline in both male and female teeth in the maxilla and summed total. In all cases, the prevalence of LEH declines in the Late Group.

When all of the Non Nok Tha permanent teeth are combined (Table 5.16), the phase differences in the sexes noted above are substantially weakened. Although the prevalence of LEH in the subadult teeth is fairly high (15.4%), nearly all of those cases fall in the Late Group, thus increasing the prevalence of LEH in the Late Group. There are significant decreases in LEH in male and female maxillary teeth between the Early and Late Groups.

Table 5.16. Summary of LEH Prevalence by Sex and Group in All Non Nok Tha Permanent Teeth

Teeth		Early (EP, MP 1-3)		Late (MP 4-8)		Statistic	
		A/O	%	A/O	%	Test	p
Male	Maxilla	**17/121**	**14.0**	**11/143**	**7.7**	**χ^2=2.794**	**0.095**
	Mandible	4/143	2.8	5/128	3.9	FET	0.739
	Total	21/264	8.0	16/271	5.9	χ^2=0.873	0.350
Female	Maxilla	**14/182**	**7.7**	**2/109**	**1.8**	**χ^2=4.501**	**0.034**
	Mandible	7/176	4.0	2/127	1.6	FET	0.312
	Total	**21/358**	**5.9**	**4/236**	**1.7**	**χ^2=6.138**	**0.013**

Note: A=affected, O=observed, FET=Fisher's.Exact Test (2-tailed probability). Includes 83 individuals: 40 males, 43 females; 42 Early Group, 41 Late Group. **Bold** indicates statistical significance (α=0.10).

Combining the sexes and examining the difference between the phases at Non Nok Tha using all permanent teeth, Table 5.17, shows a decline in LEH prevalence between the Early and Late Group. A significant difference is noted in the Early and Late Group maxillary teeth (10.2% : 5.0%), the premolars (6.3% : 2.1%), and in all teeth combined (6.8% : 3.8%).

Table 5.17. Summary of LEH Prevalence by Group in All Non Nok Tha Permanent Teeth

Teeth	Early (EP, MP 1-3)		Late (MP 4-8)		Statistic	
	A/O	%	A/O	%	Test	*p*
Maxilla	**31/303**	**10.2**	**13/258**	**5.0**	**χ^2=5.198**	**0.023**
Mandible	11/319	3.4	7/262	2.7	χ^2=0.289	0.591
All Molars	13/272	4.8	5/208	2.4	χ^2=1.843	0.175
All Premolars	**11/175**	**6.3**	**3/141**	**2.1**	**χ^2=3.189**	**0.074**
All Canines	7/88	8.0	4/64	6.3	χ^2=0.160	0.689
All Incisors	11/87	12.6	8/107	7.5	χ^2=1.450	0.229
All Teeth	**42/622**	**6.8**	**20/520**	**3.8**	**χ^2=4.659**	**0.031**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 86 individuals: 40 males, 43 females, 3 ?sex; 42 Early Group, 44 Late Group. **Bold** indicates statistical significance (α=0.10).

There are significant sex differences in the prevalence of pitting defects in the Non Nok Tha adult permanent teeth. Examining these defects by phase and sex (Table 5.18) documents a lack of sex differences in the Early Group (male teeth 3.1%; female teeth 2.1%). In the Late Group however, female teeth have a complete absence of pitting defects, resulting in significant sex differences in the maxilla, mandible and in the combined total.

Pitting defects are twice as frequent in male teeth in the Late Group (6.4%) than in the Early Group (3.1%), a difference which is statistically significant (χ^2=3.001, p=0.083), but when the sexes are combined the absence of defects in the female teeth serves to dilute this

Table 5.18. Prevalence of Hypoplastic Pitting, By Sex and Group in Permanent Teeth (>15 years) at Non Nok Tha

(# of Individuals) Affected/Observed teeth Jaw/Tooth	Early Group (EP 1 - 3, MP 1 - 3)						Late Group (MP 4 - 8)					
	Male (16)		Female (20)		Statistic		Male (19)		Female (18)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla Molars	0/49	0.0	0/73	0.0			2/51	3.9	0/42	0.0	FET	0.499
Premolars	0/36	0.0	0/49	0.0			1/38	2.6	0/35	0.0	FET	1.000
Canine	4/16	25.0	1/21	4.8	FET	0.144	4/16	25.0	0/11	0.0	FET	0.123
Incisors	0/15	0.0	1/28	3.6	FET	1.000	0/27	0.0	0/20	0.0		
Total Maxillary Pitting	4/116	3.4	2/171	1.2	FET	0.226	**7/132**	**5.3**	**0/108**	**0.0**	**FET**	**0.017**
Mandible Molars	0/63	0.0	0/72	0.0			**6/49**	**12.2**	**0/50**	**0.0**	**FET**	**0.012**
Premolars	0/44	0.0	0/44	0.0			2/33	6.1	0/32	0.0	FET	0.492
Canines	4/22	18.2	5/24	20.8	FET	1.000	1/16	6.3	0/16	0.0	FET	1.000
Incisors	0/12	0.0	0/22	0.0			0/21	0.0	0/26	0.0		
Total Mandibular Pitting	4/141	2.8	5/162	3.1	FET	1.000	**9/119**	**7.6**	**0/124**	**0.0**	**FET**	**0.001**
Total Pitting Defects	8/257	3.1	7/333	2.1	χ^2=0.598	0.439	**16/251**	**6.4**	**0/232**	**0.0**	**χ^2=15.30**	**0.000**

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). Representing 73 individuals: 36 Early Group, 37 Late Group. **Bold** indicates statistical significance (α=0.10).

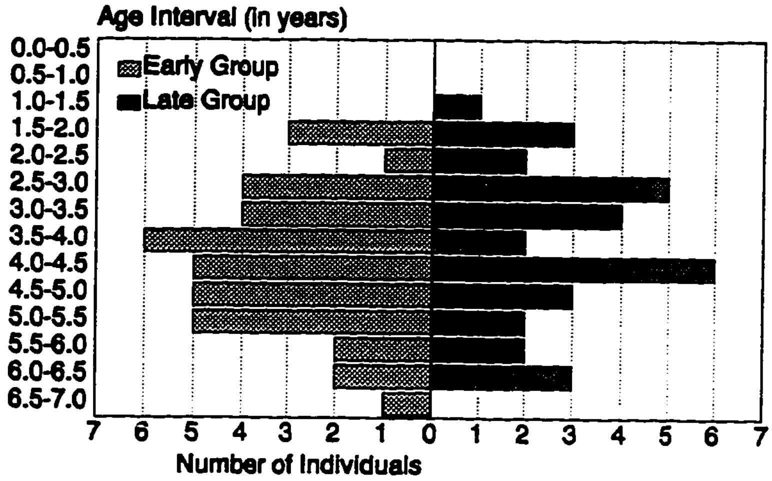
change. There is no significant difference in the prevalence of pitting defects between the phases when the sexes are combined (Early 2.5%, Late 3.3%) [Table 5.19].

Table 5.19. Summary of Pitting Prevalence by Group in All Non Nok Tha Permanent Teeth

Teeth	Early (EP, MP 1-3)		Late (MP 4-8)		Statistic	
	A/O	%	A/O	%	Test	*p*
Maxilla	6/287	2.1	7/240	2.9	χ^2=0.371	0.543
Mandible	9/303	3.0	9/243	3.7	χ^2=0.228	0.633
All Molars	**0/257**	**0.0**	**8/192**	**4.2**	**FET**	**0.001**
All Premolars	0/173	0.0	3/138	2.2	FET	0.086
All Canines	14/83	16.9	5/59	8.5	χ^2=2.096	0.148
All Incisors	1/77	1.3	0/94	0.0	FET	0.450
All Teeth	15/590	2.5	16/483	3.3	χ^2=0.562	0.454

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 73 individuals: 35 males, 38 females; 36 Early Group, 37 Late Group. **Bold** indicates statistical significance (α=0.10).

Examination of a temporal change in age-at-occurrence of enamel hypoplasias (Figure 5.19), shows a fairly erratic distribution in the Late Group. There are two peaks: one at 2.5-3.0 years and another at 4.0-4.5 years. In the Early Group, the distribution is more dome-shaped, with the largest number of individuals with defects in the 3.5-4.0 year interval. Calculation of the mean age-at-occurrence in the canine teeth only, gives an Early Group mean of 4.51 years (SD=0.37) and a Late Group mean of 4.44 years (SD=0.30). This difference is not significant (t=0.1492, df=25, α=0.10) and belies the apparent differences seen in the distribution of all teeth.



Note: Includes all teeth

Figure 5.19. Non Nok Tha Enamel Hypoplasias, By Group

Summary

Dental enamel hypoplasia, most commonly linear enamel hypoplasia (LEH) is noted in 14.5% of the subadult permanent teeth from Non Nok Tha. In adults, only 7.9% (87/1095) of the teeth are affected, most commonly the canines and incisors of both jaws. Hypoplasias are more common in male teeth (10.3%) than female teeth (5.8%), a difference which is statistically significant. The frequency of LEH is nearly equal in Non Nok Tha male teeth (5.3%) and female teeth (4.2%), while pitting defects are more common in males (4.9% :1.2%). There is a significant sex difference in the mean age-at-occurrence of enamel hyopolasias (using only the canine teeth), 4.17 years in males and 4.66 years in females.

There is a decline in the prevalence LEH over time in both male and female teeth at Non Nok Tha, statistically significant in the latter. The decline is reflected in the molar and premolar teeth of both sexes and is statistically significant when the sexes are combined (6.8% : 3.8%). There is a slight increase in pitting defects over time (2.5% : 3.3%), an increase attributable to an increase in affected male teeth, as pitting defects completely disappear in female teeth of the Late Group. The mean age-at-occurrence of enamel hypoplasias of the canine teeth only, reflects a slight decline in the Late Group, but the difference is not statistically significant.

INDICATORS OF ANEMIA

This section presents the evidence for anemia in the Non Nok Tha adults and subadults. Included are observations of porotic hyperostosis of the vault and orbits (cribra orbitalia), measurements of vault thickness, measurements of the thickness of the diplöe, and observations of enlarged nutrient foramina in the metatarsals.

Cribra Oribitalia in Non Nok Tha Adults and Subadults

Observations of the orbital roofs in all cranial material were made for the presence of cribra orbitalia. Each orbit was scored either present or absent, with textual notations on the size of the porosis, presence of raised bone formation, and indications of healing. The data are presented both "per orbit" and "per individual" (Table 5.20, See Table B.26 and B.27).

Cribra orbitalia is noted in 13.1% (13/99) of the adult orbits examined, and in none of the subadult orbits (0/17). Female orbits (20.8%, 10/48) are affected more than three times as often as male orbits (5.9%, 3/51), a difference which is statistically significant (χ^2=43846, df=1, p=0.02874). In individuals, two males (6.5%) and five females (17.9%) are affected, a difference which is not statistically significant (FET p=0.240). Again, none of the 11 subadults is affected. Every case of cribra orbitalia noted in the Non Nok Tha remains is described as "healed".

Table 5.20. Frequency of Occurrence of Cribra Orbitalia in Adults and Subadults from Non Nok Tha, Thailand (Per Orbit and Per Individual)

A/O %	Cribra Orbitalia Per Orbit*															
	Adults (>15 years)						Subadults						Total	
	Male		Female		Total		Male		Female		Total			
Absent	48/51	94.1	38/48	79.2	86/99	86.8	12/12	100.0	5/5	100.0	17/17	100.0	103/116	88.9
Present	**3/51**	**5.9**	**10/48**	**20.8**	13/99	13.1	0/12	0.0	0/5	0.0	0/17	0.0	13/116	11.2

A/O %	Cribra Orbitalia Per Individual													
	Adults (> 15 years)						Subadults						Total	
	Male		Female		Total		Male		Female		Total			
Absent	29/31	93.5	23/28	82.1	52/59	88.1	8/8	100.0	3/3	100.0	11/11	100.0	63/70	90.0
Present	2/31	6.5	5/28	17.9	7/59	11.9	0/8	0.0	0/3	0.0	0/11	0.0	7/70	10.0

Note: A=affected, O=observed. Representing 58 adult individuals: 31 males, 27 females; and 11 subadults: 8 males, 3 females. * Right and left sides combined. **Bold** indicates statistical significance (α=0.10).

Temporal Change in Cribra Orbitalia

Examining the prevalence of cribra orbitalia in Non Nok Tha adults over time (Table 5.21), in the Early Group, there is a higher prevalence in female orbits (27.6%) and individuals (23.5%), than in males (11.5% orbits, 14.3% individuals). There is a decline in cribra orbitalia in the Late Group at Non Nok Tha in both males (0.0%) and females (11.1%), resulting in a significant decline overall, by orbit and individuals (bold cells).

Table 5.21. Temporal Change in Cribra Orbitalia Prevalence in Non Nok Tha Adults

A/O %	Cribra Orbitalia in Adult Orbits*						
	Male		Female		Total		Statistic
Early	3/26	11.5	8/29	27.6	**11/55**	**20.0**	χ^2=2.207 p=0.137 FET p=0.169
Late	0/25	0.0	2/18	11.1	**2/43**	**4.7**	
Statistic	FET p=0.125		FET p=0.277		**χ^2=4.94 p=0.03**		

A/O %	Cribra Oribitalia in Adult Individuals						
	Male		Female		Total		Statistic
Early	2/14	14.3	4/17	23.5	**6/31**	**19.4**	FET p=0.664 FET p=0.370
Late	0/17	0.0	1/10	0.0	**1/27**	**3.7**	
Statistic	FET p=0.196		FET p=0.370		**χ^2=3.33 p=0.07**		

Note: A=affected, O=observed, FET=Fisher's Exact Test (one-tailed probabilities). * Right and left sides combined. **Bold** indicates statistical significance (α=0.10).

There are nine subadults in the Early Group (15 orbits) and two subadults in the Late Group (two orbits), none of which is noted to have cribra orbitalia. Combining the adults and subadults (Table 5.22), cribra orbitalia occurs in 15.1% (11/70) of the Early Group orbits examined. There is a significantly greater prevalence in female orbits (23.5%) than in male orbits (8.3%) in the Early Group (bold cells).

Table 5.22. Temporal Change in Cribra Orbitalia Prevalence in Non Nok Tha Adults and Subadults

Group A/O %	Cribra Orbitalia in All Orbits*						
	Male		Female		Statistic	Total	
Early	**3/36**	**8.3**	**8/34**	**23.5**	**χ^2=3.049 *p*=0.081**	**11/70**	**15.1**
Late	0/27	0.0	2/18	11.1	FET *p*=0.155	**2/45**	**4.4**
Statistic	FET *p*=0.180		FET *p*=0.244			**FET *p*=0.063**	

Group A/O %	Cribra Oribitalia in All Individuals						
	Male		Female		Statistic	Total	
Early	2/20	10.0	4/20	20.0	FET *p*=0.331	6/40	15.0
Late	0/19	0.0	1/10	10.0	FET *p*=0.345	1/29	9.4
Statistic	FET *p*=0.256		FET *p*=0.449			FET *p*=0.225	

Note: A=affected, O=observed, FET=Fisher's Exact Test (one-tailed probabilities). * Right and left sides combined. Represents 69 individuals: 39 males, 30 females. **Bold** indicates statistical significance (α=0.10).

Cranial Vault Porosis

Observations of cranial vault porosis, cribra orbitalia, and cranial vault thickness measurements in Non Nok Tha adults and subadults, are presented in Tables B.26 and B.27. Because of poor preservation and fragmentation, not every skull includes both orbital roofs and cranial vault, resulting in a variety of observations (Table 5.23). As in the Ban Chiang sample, rock-hard concretions as well as a thin, hard layer of mud often obscured the cortical surface of the cranial vault. Cranial vault porosis is more common in males (41.7%) than females (24.2%), a difference which is not statistically significant (χ^2=2.3523). Porosis occurs in one third of all adult crania assessed (23/69, 33.3%) in the Non Nok Tha sample [Figure 5.20].

Table 5.23. Distribution of Porotic Hyperostosis in Non Nok Tha Adults

Porotic Hyperostosis Affected/Observed	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
All Vaults	15/36	41.7	8/33	24.2	23/69	33.3
Vaults with Orbits	28		24		52	
No porosis - No cribra orbitalia	16/28	57.1	16/24	66.7	32/52	61.5
No porosis - With cribra orbitalia	0/28	0.0	3/24	12.5	3/52	5.8
Porosis And cribra orbitalia	2/28	7.1	0/24	0.0	2/52	3.8
Porosis - No cribra orbitalia	10/28	35.7	5/24	20.8	15/52	28.8

Note: A=affected, O=observed.

Cranial vault porosis occurs with cribra orbitalia in a very few of the crania in which both the vault and the orbital roof(s) are present. This suggests that either there is no positive association between porosis and cribra orbitalia in the Non Nok Tha skeletal remains, or that orbital lesions were complete remodeled by adulthood. The most common finding in this sub-sample was of porosis in the absence of changes to the orbit, still more common in male crania (35.7%) than female crania (20.8%).

Twenty-one subadult crania were also examined for evidence of gross porosity of the cranial vault bones. Nine of these crania included both calvaria and orbital roof(s), none of which is affected with cribra orbitalia.

The prevalence of porotic hyperostosis of the cranial vault in Non Nok Tha adults declines slightly over time (36.4% : 30.6%) [Table 5.24]. The most dramatic change occurs in the prevalence of porosis in female vaults, which decreases from 33.3% in the Early Group to 13.3% in the Late Group, however, this difference does not reach statistical significance.

Table 5.24. Distribution of Porotic Hyperostosis Over Time in Non Nok Tha Adults

Porotic Hyperostosis Affected/Observed	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
Early Group	6/15	40.0	6/18	33.3	12/33	36.4
Late Group	9/21	42.9	2/15	13.3	11/36	30.6
Statistic	χ^2=0.029		FET=0.242		χ^2=0.261	

Note: FET=Fisher's Exact Test (two tailed probability). **Bold** indicates statistical significance (α=0.10).

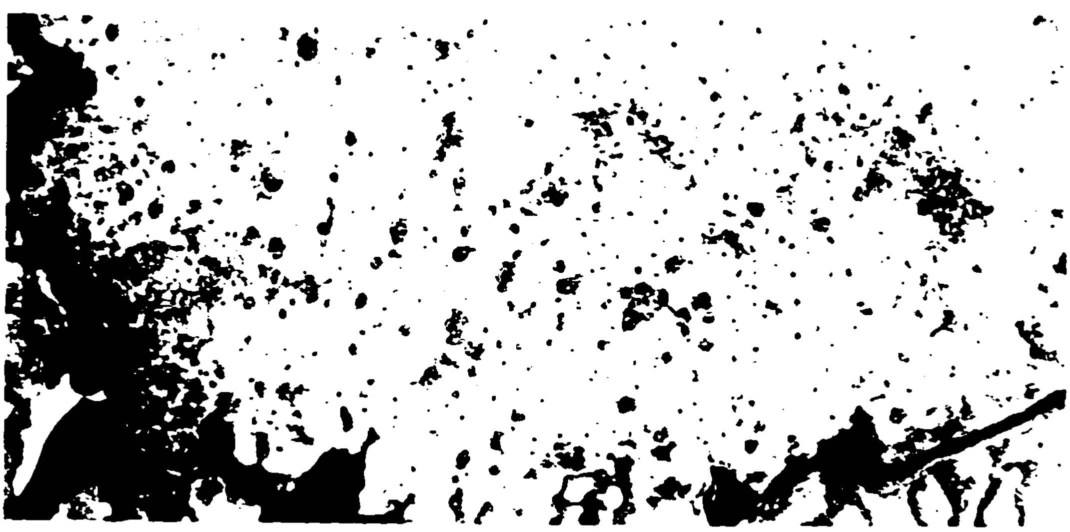


Figure 5.20. Resolved Porosis of the Cranial Vault
Healing pits of the posterior parietal give an "orange peel" texture

Cranial Vault Thickness

Individual measurements at ten anatomical points on the cranial vault are detailed in Tables B.26 and B.27. This discussion will focus on the means of these measurements. In the Non Nok Tha cranial vault sample of 82 individuals, male mean thicknesses are greater than female means in every measurement (Table 5.25). A *Student's t* test of all of these means, finds statistically significant sex differences in the mid-frontal bone, bregma, obelion, right and left asterion, and lambda (bold cells). In both sexes, the minimum measurement is 4 mm, and the maximum in males is 12 mm (mid-frontal bone, left asterion, and lambda) and 11 mm in females (parietal eminence).

Table 5.25. Mean Cranial Vault Thickness Measurements (in mm) in Non Nok Tha Adults

Measurement Point	Male				Female			
	n	Mean	SD	Range	n	Mean	SD	Range
R frontal eminence	31	6.3	1.6	4 -9	29	5.9	1.3	4 -9
L frontal eminence	34	6.4	1.5	4 -10	32	6.1	1.1	4 -8
Mid-frontal	31	**7.2**	1.8	4 -12	35	**6.3**	1.2	4 -9
Bregma	34	**7.5**	1.6	4 -11	37	**6.2**	1.6	4 -9
Obelion	31	**7.6**	1.9	4 -11	33	**6.8**	1.5	4 -10
R parietal eminence	35	6.8	1.7	4 -10	32	6.8	1.4	5 -11
L parietal eminence	33	7.1	1.6	5 -11	34	6.8	1.4	4 -9
R asterion	31	**6.9**	1.5	4 -10	24	**5.6**	1.4	4 -9
L asterion	31	**6.9**	1.8	4 -12	21	**5.5**	1.2	4 -8
Lambda	33	**8.6**	1.9	4 -12	28	**7.6**	1.5	4 -10

Note: R=right, L=left, n=number, SD=standard deviation. Representing 82 individuals: 42 males, 40 females. **Bold** indicates statistically significant sex differences in mean measurements (α=0.10).

The vault thickness measurements in subadults at Non Nok Tha (Table 5.26) illustrate a slight increase in thickness with growth. The number of measurements in the infant sample is quite small, but is suggestive of a mean thickness between one and three mm. In the children aged 2-6 years, the vault thickness is steady at three to 3.5 mm, with a maximum of 6 mm. In the subadult fraction of the population, the means range upward from three millimeters, with the greatest thickness at the mid-frontal region and lambda. Thus, shortly

Table 5.26. Mean Cranial Vault Thickness Measurements (in mm) in Non Nok Tha Subadults

Measurement Point	Infants (< 2 years)				Children (2-5.9 years)				Subadults (6-15 years)			
	n	M	sd	range	n	M	sd	range	n	M	sd	range
R frontal	1	1.0	.	-	8	3.3	0.7	2-4	5	3.6	1.9	2-7
L frontal	3	1.3	0.6	1-2	5	3.2	0.8	2-4	4	3.0	0.0	3-3
Mid-frontal	4	2.8	1.5	2-5	10	3.6	1.0	3-6	6	5.5	2.2	3-9
Bregma	0	.	.	-	8	3.1	1.0	2-5	4	4.0	0.8	3-5
Obelion	2	2.5	0.7	2-3	11	3.4	0.8	2-5	3	2.7	0.6	2-3
R parietal	2	2.5	0.7	2-3	7	3.0	0.8	2-4	5	5.4	2.3	3-9
L parietal	3	2.3	0.6	2-3	5	3.6	0.9	3-5	4	4.5	1.7	3-7
R asterion	0	.	.	-	1	3.0	.	-	2	5.0	1.4	4-6
L asterion	0	.	.	-	2	3.0	0.0	3-3	1	4.0	.	-
Lambda	2	2.5	0.7	2-3	10	3.6	0.5	3-4	5	5.6	1.1	4-7

Note: R=right, L=left, n=number, M=mean, sd=standard deviation. Representing 28 individuals: 14 children; 6 infants, 8 subadults.

after the age of six, cranial vault thickness measurements have reached minimum values recorded in adult crania.

Examining the mean thickness measurements, by age, in male and female adults at Non Nok Tha, suggests an increase in thickness from early adulthood (15-25 years) to the next decade (Table 5.27). In both sexes, vault thickness measurements decline in the oldest age interval (55+ years). There is a trend toward larger mean thickness values in the middle-age intervals in both sexes.

Table 5.27. Age Variation in Mean Cranial Vault Thickness Measurements (in mm) in Non Nok Tha Adults, By Sex

Sex/Age Interval Point	Male					Female				
	15-25	25-35	35-45	45-55	55+	15-25	25-35	35-45	45-55	55+
R frontal	4.0	9.0	6.5	6.4	6.1	5.3	6.0	6.1	6.0	5.5
L frontal	4.0	6.3	6.5	6.5	6.9‡	5.7	6.0	6.1	8.0	5.5‡
Mid-frontal	5.0	7.0	7.3	7.0	7.8‡	6.3	5.6	6.6	6.0	5.8‡
Bregma	8.0	7.0	8.2†	7.0	7.1‡	6.5	5.3	7.0†	7.0	5.0‡
Obelion	4.5	6.3	8.5†	6.8	7.9	6.3	6.0	6.7†	7.0	7.3
R parietal	4.5	6.7	7.4	7.3	6.7	6.5	6.0	7.5	6.0	6.0
L parietal	6.0	6.6	7.1	7.3	7.3	7.0	5.8	7.2	7.5	5.8
R asterion	5.0	7.0*	6.8	8.0	6.3	4.5	4.8*	6.0	9.0	6.0
L asterion	5.0	7.4*	6.7	8.3	6.3	5.0	4.3*	6.1		5.7
Lambda	6.5	8.0	9.1†	9.3	8.1	7.5	7.5	7.4†	9.5	7.3
# crania	2	5	16	6	9	4	6	15	2	5

Note: R=right, L=left, #=number. Only individuals with ages estimated in five-year intervals included: 70 individuals: 38 males, 32 females. * Statistically significant sex differences within the 25-35 year age interval. † Statistically significant sex differences within the age interval 35-45. ‡ Statistically significant sex differences within the 55+ age interval. *Student's t* test, α=0.10.

Temporal Changes in Cranial Vault Thickness

Assessing cranial vault thickness changes over time at Non Nok Tha, requires evaluation of the significant sex differences (male vaults thicker than female vaults) noted in the combined sample (Table 5.28). In the Early Group at Non Nok Tha, male vaults are significantly thicker than female vaults in the three frontal bone measurements, at the bregma and in the three posterior vault measurements. However, in the Late Group, the only statistically significant difference occurs at the right asterion. Examining the range of values in each of these groups, there is conformity between the sexes in the minimum values, but males have greater maximum values in both of the groups at Non Nok Tha.

Contrasting vault thickness measures, by sex, and through time (Tale 5.29), there is a statistically significant decrease in male mean vault thickness measurements at the frontal eminences and bregma in the Late Group. All of the other mean measurements are lower as well, although maximum values are higher in the Late Group.

In the female crania, there are no statistically significant differences in the means over time at Non Nok Tha. Maximum thickness values are one or two millimeters lower in the Late Group than in the Early Group, while minimum values are similar.

Table 5.28. Mean Vault Thickness Measurements (in mm) in Non Nok Tha Adults, By Group and Sex

Measurement Point	Early Group (EP 1-3, MP 1-3)								Late Group (MP 4-8)							
	Male			Female			Statistic		Male			Female			Statistic	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	**6.9**	1.6	4-9	**5.9**	1.5	4-9	**31**	**1.951**	5.7	1.3	4-9	6.0	1.0	4-7	25	0.724
L frontal	**7.0**	1.6	4-10	**6.1**	1.4	4-8	**33**	**1.758**	5.9	1.2	4-9	6.0	0.7	5-7	28	0.309
Mid-frontal	**7.4**	1.6	4-10	**6.4**	1.3	4-9	**32**	**2.079**	7.0	1.9	5-12	6.3	1.2	4-8	29	1.253
Bregma	**8.2**	1.2	6-10	**6.4**	1.5	4-9	**33**	**3.836**	7.0	1.6	4-11	6.2	1.7	4-9	33	1.334
Obelion	7.9	2.2	4-10	6.8	1.5	4-10	31	1.557	7.4	1.7	5-11	6.8	1.4	4-9	28	1.084
R parietal	7.3	1.7	4-10	6.8	1.5	5-11	36	1.036	6.4	1.6	4-10	6.9	1.2	5-9	27	0.934
L parietal	**7.6**	1.6	5-10	7.0	1.4	5-9	34	1.122	6.6	1.6	5-11	6.5	1.3	4-8	29	0.276
R asterion	**7.0**	1.4	5-10	**5.6**	1.6	4-9	**30**	**2.702**	**6.7**	1.6	4-10	**5.6**	1.1	4-7	**21**	**1.773**
L asterion	**7.1**	1.9	5-12	**5.3**	1.1	4-7	**26**	**3.168**	6.7	1.7	4-10	5.7	1.4	4-8	22	1.573
Lambda	**9.0**	2.2	4-11	**7.6**	1.7	4-10	**30**	**2.062**	8.2	1.6	5-12	7.5	1.2	5-9	27	1.188
# crania	20			23					22			16				

Note: R=right, L=left, SD=standard deviation, *df*=degrees of freedom, *t=Student's t-test* of the means. Representing 81 individuals: 43 Early Group, 38 Late Group. **Bold** cells indicate statistically significant differences between the sexes, within the group (α=0.10).

Table 5.29. Mean Vault Thickness Measurements (in mm) in Non Nok Tha Adults, By Sex and Group

Measurement Point	Male								Female							
	Early Group			Late Group			Statistic		Early Group			Late Group			Statistic	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	**6.9**	1.6	4-9	**5.7**	1.3	4-9	**29**	**2.413**	5.9	1.5	4-9	6.0	1.0	4-7	27	0.235
L frontal	**7.0**	1.6	4-10	**5.9**	1.2	4-9	**32**	**2.273**	6.1	1.4	4-8	6.0	0.7	5-7	29	0.268
Mid-frontal	7.4	1.6	4-10	7.0	1.9	5-12	29	0.619	6.4	1.3	4-9	6.3	1.2	4-8	32	0.237
Bregma	**8.2**	1.2	6-10	**7.0**	1.6	4-11	**32**	**2.465**	6.4	1.5	4-9	6.2	1.7	4-9	34	0.342
Obelion	7.9	2.2	4-10	7.4	1.7	5-11	29	0.628	6.8	1.5	4-10	6.8	1.4	4-9	30	0.136
R parietal	7.3	1.7	4-10	6.4	1.6	4-10	33	1.641	6.8	1.5	5-11	6.9	1.2	5-9	30	0.283
L parietal	7.6	1.6	5-10	6.6	1.6	5-11	31	1.659	7.0	1.4	5-9	6.5	1.3	4-8	32	1.035
R asterion	7.0	1.4	5-10	6.7	1.6	4-10	29	0.496	5.6	1.6	4-9	5.6	1.1	4-7	22	0.100
L asterion	7.1	1.9	5-12	6.7	1.7	4-10	29	0.603	5.3	1.1	4-7	5.7	1.4	4-8	19	0.615
Lambda	9.0	2.2	4-11	8.2	1.6	5-12	31	1.165	7.6	1.7	4-10	7.5	1.2	5-9	26	0.074
# crania	20			22					23			16				

Note: R=right, L=left, SD=standard deviation. Representing 81 individuals: 43 Early Group, 38 Late Group. **Bold cells indicate statistically** significant differences between the groups, within the sexes (*Student's t* test of the means, α=0.10).

Combining the sexes, and examining cranial vault thickness measurements over time (Table 5.30), finds few statistically significant differences between the Early and Late Groups at the site. There is a general decline in vault thickness in the later group, with statistically significant decreases in the left frontal eminence and left parietal eminence thickness measures.

Table 5.30. Temporal Change in Mean Vault Thickness Measurements (in mm) in Adults

Measurement Point	Early Group			Late Group			*Student's t*	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	6.4	1.6	4-9	5.8	1.2	4-9	58	1.552
L frontal	**6.5**	1.5	4-10	**5.9**	1.0	4-9	**59**	**1.907**
Mid-frontal	6.8	1.5	4-10	6.6	1.6	4-12	63	0.456
Bregma	7.1	1.6	4-10	6.6	1.7	4-11	68	1.229
Obelion	7.3	1.9	4-10	7.1	1.6	4-11	61	0.313
R parietal	7.0	1.6	4-11	6.6	1.5	4-10	65	1.100
L parietal	**7.3**	1.5	5-10	**6.6**	1.5	4-11	**65**	**1.846**
R asterion	6.3	1.7	4-10	6.3	1.5	4-10	53	0.153
L asterion	6.4	1.8	4-12	6.3	1.7	4-10	50	0.049
Lambda	8.3	2.0	4-11	8.0	1.5	5-12	59	0.617
# crania	43			38				

Note: R=right, L=left, SD=standard deviation. Representing 48 individuals: 24 males, 24 females. **Bold** cells indicate statistically significant differences between group means (α=0.10).

The sub-sample of the cranial vaults with at least one measurement of the mid-frontal, frontal or parietal eminences which is greater than one standard deviation above the mean (Table 5.31, bold numbers) consists of 17 adults (6 females, 11 males). In only three of the individuals (17.6%), are all of the measurements greater than one standard deviation above the mean: Burial 1-2, Burial 2-9, and Burial 2-62.

Table 5.31. Individual Burials with Maximum Thickness at Selected Measurement Points

Burial				Frontal Eminence		Mid frontal	Parietal Eminence		Porosis	
No.	Sex	Age	Per.	Right	Left		Right	Left	Vault	Orbits
1-2	F	40-45	M2	**9**	**8**	**9**	**11**		0	R+L+
1-43	F	40-45	M7	7	7	7	**9**	8	0	R-L-
2-4	F	40-45	E1	7	6	**9**	7	7	0	R-L-
2-71A	F	35-40	M1	7	8	5	8	**9**	0	R-
2-123	F	Adult	M1	6	6	7	8	**9**	F A	L-
2-M125	F	30-40	E1	5	6	6	7	**9**	H	
1-26	M	30-35	E3	**9**	**9**	8	7	7	H	
2-9	M	40-45	M4	**9**	**9**	**12**	**10**	**11**	H	R-
2-41	M	40-45	M1	8	7	9	**10**	**10**	0	R-L-
2-42	M	50-60	E2	7	8	8	**9**	**9**	0	R-L-
2-52	M	50-55	E3	8	8	7	6	**9**		
2-55	M	35-40	M4	5	6	**10**	**9**	**9**	0	R-L-
2-62	M	45-50	E1	**9**	**10**	**10†**	**9**	**9**		R-L-
2-73	M	MA	M1	**9**				8	0	
2-73A	M	MA			**9**					
2-76	M	35-40	M1	6	7	8	**9**	8		
2-89	M	50-60	E2	7	7	8	8	**10**	C H	R+

Note: Maximum thickness defined as greater than one standard deviation above the sex-specific mean (See Table 5.24), shown in **bold**. Other measurements shown for reference. † metopism present. F=female, M=male, C=coarse (>0.5 mm), F=fine (<0.5 mm), A=active, H=healed, 0=none, R=right, L=left, -=absent, +=present.

There is no apparent relationship between thickness and the presence of porosis of any kind (5/13, 38.5%), or cribra orbitalia (2/11, 18.2%). Thirteen of these individuals (76.5%) are from the Early Period at Non Nok Tha, and only five (29.4%) are from the later group.

In the Non Nok Tha subadult sample of cranial vaults (n=28), seven (25.0%) have one or more measurements of maximum thickness (Table 5.32). Only one of these has active vault porosis (14.3%), and there are no observations of cribra orbitalia (0/3), although the sample sizes are small. The majority of these crania (71.4%) are from the Early Group at Non Nok Tha.

Table 5.32. Individual Subadult Burials with Maximum Thickness at Selected Measurement Points

Burial	Sex	Age	Frontal Eminence		Mid-frontal	Parietal Eminence		Porosis	Cribra Orbitalia
			Right	Left		Right	Left		
2-12	?M	9-12m	1	1	**5**			0	R-L-
2-14	?M	2-4	4	4	**6**	3	4	F A	L-
2-112	?M	3-5	4	3	4	4	**5**	0	R-L-
1-7	?F	6-8			**9**				
1-74	?F	8-10	**7**		**7**		**9**	0	
2-25	?M	9-11				9	**6-7**		
2-116	?F	12-14					**9**		

Note: Maximum thickness defined as greater than one standard deviation above the age-specific mean (See Table 2), shown in **bold**. Other measurements shown for reference. F=female, M=male, m=month, C=coarse (>0.5 mm), F=fine (<0.5 mm), A=active, H=healed, 0=none, R=right, L=left, - =absent, +=present.

Cortex:Diplöe Ratio

In his analysis of the Willandra Lakes hominids, Webb (1989) measured the thickness of the inner and outer tables, the diplöe, and the total cranial vault thickness to calculate the percentage of diploic bone [(diplöe/total thickness) x 100]. The measurements were made "anywhere on broken edges excluding the asterion and occipital squama" (1989:15). This criteria for measurement was used because the cranial remains were quite fragmentary and often unreconstructable. A ratio of compact bone to diplöe in the vault has also been suggested as a clinical criteria for the diagnosis of anemia: A ratio greater than 1:2.5 suggests diploic thickening as a response to anemia (Reynolds 1965). This ratio seems quite awkward, since the denominator is conventionally one in any ratio which is a statement of probability: e.g. the odds are two to one (2:1). For purposes of this discussion, the ratio will be reversed, so that a diplöe to compact bone ratio greater than 2.5 suggests the presence of anemia (2.5:1). These two ratios are complementary, and may serve to cross-check the data. A ratio of diplöe:compact bone of 2.5:1 suggests a total thickness of 3.5, with the diplöe comprising 71.4% (2.5/3.5) of the total bone thickness.

In the Non Nok Tha cranial vault remains, measurements of the inner and outer tables, and the diplöe of the frontal and parietal bones, were made (to the nearest 0.01 mm), as closely as possible to the primary landmarks used for measuring cranial vault thickness (Table B.28). Since cranial vault thickness was measured using a larger scale (nearest mm), and the exact landmark often was not available, there may be some error between the measurements (i.e. the sum of the inner and outer tables and diplöe, may not equal the vault thickness). The two different ratios are calculated.

Thirty-seven individuals are represented by vault bone measurements, including six children ranging in age from one to 11 years (Table 5.33). There is a wide range in thickness of the constituents of the vault: the inner table range is 2.98 mm (0.46 - 3.44 mm), the range of the outer table is 5.99 mm (0.96 - 6.95mm), and the diplöe range at 5.48 mm (1.19 to 6.67 mm). Not unreasonably, the outer table is typically thicker than the inner table.

Table 5.33. Mean Measurements (in mm) and Ratios of the Cranial Vault Bone Components in Adults

Vault Bone Measurement/Ratio	Male			Female		
	Mean	SD	Range	Mean	SD	Range
Frontal bone	n=7			n=2		
Thickness	7.71	1.60	5-10	6.00	.	-
Outer table	2.28	0.44	1.71-2.85	1.72	0.62	1.28-2.15
Diplöe	3.58	1.02	1.63-4.71	2.57	1.24	1.69-3.44
Inner table	2.12	0.76	1.18-3.44	1.52	0.10	1.45-1.59
Diplöe/Compact	0.87	0.40	0.39-1.63	0.86	0.57	0.45-1.26
Diplöe/Thickness	0.46	0.12	0.33-0.67	0.43	0.21	0.28-0.57
Parietal bone	n=9			n=13		
Thickness	7.89	1.83	5-10	7.00	1.58	5-11
Outer table	2.08	0.50	1.61-2.81	2.45	1.40	1.46-6.95
Diplöe	4.04	1.72	1.19-6.47	3.07	0.68	2.06-4.48
Inner table	1.67	0.51	1.04-2.57	1.50	0.34	1.00-2.01
Diplöe/Compact	1.07	0.41	0.31-1.58	0.83	0.25	0.26-1.11
Diplöe/Thickness	0.49	0.14	0.24-0.65	0.46	0.12	0.19-0.63

Note: SD=standard deviation, n=number. Representing 31 adults.

Table 5.34. Vault Constituent Mean Measurements and Ratios, By Sex, in Adults from Non Nok Tha

Measurement Ratio	Male (n=16)			Female (n=15)			Statistic	
	Mean	SD	Range	Mean	SD	Range	*Student's t*	df
Thickness	7.81	1.68	5-10	6.87	1.51	5-11	1.646	29
Outer table	2.17	0.47	1.61-2.85	2.35	1.33	1.28-6.95	0.506*	17.2
Diplöe	3.84	1.43	1.19-6.47	3.00	0.73	1.69-4.48	**2.059***	**22.7**
Inner table	1.87	0.65	1.04-3.44	1.48	0.37	0.67-2.01	**2.076***	**23.9**
Diplöe/Compact	0.98	0.41	0.31-1.63	0.84	0.28	0.26-1.26	1.1394	29
Diplöe/Thickness	0.48	0.13	0.24-0.67	0.45	0.12	0.19-0.63	0.6211	29

Note: Combined frontal and parietal eminences. SD=standard deviation. *Test of the H_0 (variances are equal) is rejected. **Bold** cells indicate significant results with unequal variances (α=0.10).

The presence of only two frontal bone measurements in the female sample of cranial vault bones, results in a skewed sample. As noted above in the external measurements of the cranial vault, measures of the vault bone constituents are also larger in males than in females. The ratios, however, are nearly equal. No statistically significant differences are found between the frontal eminence and parietal eminence means, suggesting that the bones can be combined for further analysis.

There are statistically significant sex differences in the mean thickness of the diplöe and inner table, with greater thicknesses in males (Table 5.34). There are no statistically significant differences in either of the calculated ratios, a procedure which helps smooth the data. The sexes can be combined for an examination of age changes in these thickness measures (Table 5.35).

Table 5.35. Summary of Age Differences in Vault Constituent Mean Measurements and Ratios

Measurement Ratio	Young Adult			Middle-aged			Old		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Thickness	**5.86**	1.07	5-8	**8.23**	1.54	6-11	**7.40**	1.43	5-10
Outer table	2.04	0.56	1.3-2.8	2.53	1.39	1.6-7.0	2.10	0.43	1.7-2.8
Diplöe	**2.69**	1.12	1.2-4.5	**3.70**	1.24	2.1-6.5	**3.74**	1.03	1.9-5.5
Inner table	1.51	0.30	1.0-2.0	1.78	0.54	1.0-2.6	1.68	0.70	1.0-3.4
Diplöe/Compact	0.79	0.39	0.3-1.3	0.91	0.35	0.3-1.6	1.03	0.34	0.6-1.6
Diplöe/Thickness	0.45	0.16	0.2-0.6	0.45	0.12	0.2-0.6	0.51	0.11	0.3-0.7

Note: Frontal and parietal bone observations are combined. SD=standard deviation. **Bold** cells indicate statistically significant differences in the mean measurements between young and middle age, young and old aged adults (*Student's t* test, α=0.10). No statistically significant differences were found between middle and old aged adults.

There is a statistically significant increase in total vault thickness as well as the diplöoe thickness from young adults to middle-aged adults. The ratio of diplöe to compact bone also increases (0.79:1 ; 0.91:1), suggesting an increase in diplöe relative to cortex, but this difference is not reflected in the diplöic percentage of the total thickness, which stays the same at 45%. In the old aged sample, there is a decline in all the values (although they are still greater than those seen in the young adults), except the diplöe and the two ratios (Diplöe/Compact and Diplöe/Thickness). The increase in these latter three variables likely reflects a loss of the compact bone of the inner and outer tables (note the diplöe mean remains the same), resulting in a slight increase in the percentage of diplöe (51%), and an increase in the diplöe:compact ratio to approximately 1:1.

Examining the subadult cranial vault sample (Table 5.36) documents the presence of an elevated diplöe:compact ratio (1.45:1) and percentage of diplöe to thickness (59%) in the subadult vaults relative to the adult vaults (0.94:1 and 46% respectively). Naturally, the other dimensions of the vault are expected to be smaller than those in adults. It is also evident that the maximum value for the diplöe:compact ratio (2.2) is found in subadults at Non Nok Tha.

Table 5.36. Vault Constituent Mean Measurements (in mm) and Ratios in Adults and Subadults

Measurement Ratio	Subadults (n=6)			Adults (n=36)			Statistic	
	Mean	sd	Range	Mean	sd	Range	*Student's t*	df
Thickness	5.17	1.72	3-7	7.41	1.64	5-11	**3.043**	**36**
Outer table	1.32	0.32	1.0-1.9	2.23	0.97	1.3-7.0	**4.217***	**25.2**
Diplöe	3.11	1.22	1.4-4.2	3.44	1.19	1.2-6.5	0.6273	36
Inner table	0.88	0.46	0.5-1.5	1.66	0.57	0.6-3.4	**3.143**	**36**
Diplöe/Compact	1.45	0.59	0.6-2.2	0.94	0.37	0.3-1.7	**2.793**	**36**
Diplöe/Thickness	0.59	0.11	0.5-0.7	0.46	0.12	0.2-0.7	**2.387**	**36**

Note: n=number of individuals, sd=standard deviation. * Test of the H_0 (variances are equal) is rejected. **Bold** cells indicate significant results (α=0.10).

Both of these maximums approach the clinical threshold for a diagnosis of genetic anemia (2.5:1 after Reynolds 1965), and the calculated relative thickness of the diplöe (71.4%), and are found in two different subadults (Burials 1-74 and 1-84 respectively). Additionally, Burial 2-14, also a child, has a relative diplöe thickness of 70.3%. All of these burials are from the Early Group at Non Nok Tha.

Analysis of temporal changes in the adult vault thickness measures (Table 5.37), finds no statistically significant differences except in the diplöe:compact ratio which declines in the Late Group (1.09 : 0.85). When the subadults are added to the sample, there are additional statistically significant differences in the inner table thickness (1.31 : 1.67), the ratio (1.19 : 0.89), and the relative thickness of the diplöe (52% : 45%), all reflecting a decrease in diploe thickness over time.

Table 5.37. Mean Measurements and Ratios of the Cranial Vault Bone Components, By Group

Measurement Ratio	Early Group (n=13)			Late Group (n=17)			Statistic	
	Mean	SD	Range	Mean	SD	Range	*Student's t*	df
Thickness	7.85	1.82	5-11	7.00	1.50	5-10	1.3968	28
Outer table	2.35	1.44	1.5-7.0	2.11	0.46	1.3-2.9	0.5873*	13.9
Diplöe	3.82	1.00	2.1-5.5	3.16	1.32	1.2-6.5	1.4990	28
Inner table	1.51	0.54	0.6-2.6	1.69	0.43	1.0-2.6	0.9850	28
Diplöe/Compact	**1.09**	**0.38**	**0.3-1.7**	**0.85**	**0.36**	**0.3-1.6**	**1.7430**	**28**
Diplöe/Thickness	0.50	0.12	0.2-0.6	0.44	0.13	0.2-0.7	1.3684	28

Note: Frontal and parietal bone observations are combined, n=number of individuals, SD=standard deviation. * Variances are not equal. **Bold** cells indicate statistically significant results, ***Student's t-test*** (α=0.10).

Enlarged Nutrient Foramina

In the Non Nok Tha skeletal series, four individuals, are noted to have enlarged nutrient foramina in seven metatarsals (Burials 1-28, 1-64, 2-24, and 2-85). Neither the metacarpals nor the hand or foot phalanges are noted to be affected. There are no apparent sex differences in adults (Table 5.38), with a nearly equal prevalence in male (1.3%) and female (1.1%) metatarsals. In the subadults, a single ?sex child, accounts for all three affected metatarsals. Using individuals with at least one metatarsal available, the individual frequency in males is 6.3% (2/32), in females 2.9% (1/34), and in subadults 14.3% (1/7).

Table 5.38. Prevalence of Enlarged Nutrient Foramina of the Non Nok Tha Metatarsals

Enlarged Foramina Affected/Observed		Adult		Subadult			Total		
		Male	Female	Male	Female	?Sex	Male	Female	?Sex
MT1	Right	0/19	0/22	0/2	0/1	0/2	0/21	0/23	0/2
	Left	0/19	0/20		0/1	1/1	0/19	0/21	1/1
MT2	Right	0/17	0/19	0/2		1/2	0/19	0/19	1/2
	Left	0/21	0/20		0/1	0/2	0/21	0/21	0/2
MT3	Right	0/17	1/17	0/1		1/2	0/18	1/17	1/2
	Left	1/15	1/19		0/1	0/1	1/15	1/20	0/1
MT4	Right	1/14	0/16	0/1		0/2	1/15	0/16	0/2
	Left	0/16	0/20			0/2	0/16	0/20	0/2
MT5	Right	0/16	0/15	0/1		0/2	0/17	0/15	0/2
	Left	0/12	0/18		0/1	0/2	0/12	0/19	0/2
MT1-5	Right	1/83	1/89	0/7	0/1	2/10	1/90	1/90	2/10
	Left	1/83	1/97		0/2	1/7	1/83	1/99	1/7
All	A/O	2/166	2/186	0/7	0/3	3/17	2/173	2/189	3/17
	%	1.2	1.1	0.0	0.0	17.6	1.2	1.1	17.6

Note: A=affected, O=observed, MT=metatarsal. Representing 73 individuals: 64 adults (31 males, 33 females), 9 subadults (3 males, 3 females, 3 ?sex). Affected metatarsals occur in two males, one female, and one ?sex individual.

The most commonly affected metatarsal is the third (5.5%, 4/73), with single observations in the first, second, and fourth metatarsals. There is no apparent side predilection, with four affected right metatarsals (4/190, 2.1%) and three affected left metatarsals (3/189, 1.6%). The overall, by bone, prevalence of enlarged nutrient foramina at Non Nok Tha is 1.85% (7/379).

There is a large difference in the temporal occurrence of the enlarged nutrient foramina at Non Nok Tha (Table 5.39), the majority of the affected metatarsals are noted in the Early Group (3.2%), with two cases in the Late Group (0.9%). On an individual basis however, the prevalence of enlarged nutrient foramina in the metatarsals in the Early Group (2/35, 5.7%) is nearly equal to that in the Late Group (2/37, 5.4%).

Table 5.39. Prevalence of Enlarged Nutrient Foramina of the Metatarsals, By Group

Enlarged Foramina Affected/Observed	Early Group (EP 1-3, MP 1-3)		Late Group (MP 4-8)	
	A/O	%	A/O	%
MT1	1/41	2.4	0/46	0.0
MT2	1/31	3.2	0/50	0.0
MT3	3/31	9.7	1/41	1.9
MT4	0/27	0.0	1/44	2.3
MT5	0/28	0.0	0/39	0.0
TOTAL	5/158	3.2	2/220	0.9

Note: A=affected, O=observed, MT=metatarsal. Representing 72 individuals: 35 Early Group, 37 Late Group.

Summary of Anemia Indicators

The evidence for iron deficiency anemia in the Non Nok Tha skeletal series is found in the frequency of occurrence of cribra orbitalia, porotic hyperostosis, cranial vault thickening orbits observed (11.9% of individuals), and in no subadult orbits (0/17). Female orbits are affected nearly three times as often as male orbits (20.8% : 5.9%), but there is no statistically significant difference in sex in individuals affected (17.9% : 6.5%).

The mean cranial vault thickness at 10 anatomical points is greater in males than in females. Maximum thickness reaches 12 mm in males and 11 mm in females, and thickness is typically greater along the suture lines (e.g. bregma, obelion, lambda) than at the eminences. Comparison of the relative thickness of the diplöe to the compact bone of the inner and outer tables in 37 individuals also supports greater thickness in males. There is no occurrence of vault thickness of either component exceeding the clinical definition for anemia. Enlarged nutrient foramina of the metatarsals are noted in seven metatarsals in four individuals, for a frequency of 1.85% metatarsals (7/379), and 5.8% individuals (4/73). There is no obvious sex affiliation.

Temporal changes in anemia indicators include the observation of the majority of cribra orbitalia in the Early Group orbits, reflecting a decline over time. The greater mean cranial vault thickness measurements observed in males is true in the Early Group, but in the Late Group, there is no significant difference between the sexes. No appreciable increase could be noted in the females, suggesting that mean thickness may be declining in males. When the sexes are combined, the mean thickness measures of the Early Group are nearly equal to the Late Group. The ratio of diplöe:compact bone in the frontal and parietal eminences declines in the Late Group, reflecting the decline in overall thickness. The frequency of enlarged nutrient foramina of the metatarsals is greater in the Early Group (3.2% metatarsals) than in the Late Group (0.9% metatarsals), but the "by individual" frequency is equal.

DECIDUOUS DENTAL PATHOLOGY

The deciduous teeth in 32 subadults from Non Nok Tha were examined for a variety of dental pathologies (Table 5.40). The sample has a large number (n=8) of infants (≤1 year) and a large number of subadults in the 3-4 year age ranges (n=10), which is likely to be a function of the aging methods employed, as well as representing mortality peaks. Table 5.40 summarizes all of the dental pathologies recorded in this sample. There were no instances of abscessing (0/235); dental caries (2.4%) and enamel hypoplasias (3.8%) are rare. Calculus formation on the deciduous teeth is slight in 8.8% of the teeth, and attrition primarily involves the enamel (68.1%) and dentin (27.1%). Variation in each of these pathologies, by sex, age, and group will be examined in the following section.

Table 5.40. Age Distribution of Subadult Deciduous Tooth Sample from Non Nok Tha

Age (years)*	Male		Female		?Sex		Total	
	Indiv.	Teeth	Indiv.	Teeth	Indiv.	Teeth	Indiv.	Teeth
< 1	3	17	0		0		3	17
1	1	2	3	19	0		4	21
2	2	36	2	20	0		4	56
3	4	49	2	31	1	1	7	81
4	2	20	1	2	1	7	4	29
5	0		1	4	1	6	1	10
6	0		0		1	7	1	7
7	2	11	2	14	0		4	25
8	1	5	0		0		1	5
9	0		1	5	0		1	5
10-11	1	4	0		0		1	4
Total	16	144	12	95	4	21	32	260

* Based upon mean age estimate: i.e. burial aged 5-7 is placed in the 6 year interval.
Indiv.=individual, teeth present include present, erupting and unerupted.

Table 5.41. Prevalence of Pathology Recorded in Deciduous Teeth from Non Nok Tha (Right and Left Sides Combined)

Trait/ Variation	Maxilla								Mandible								Total	
	Molars		Canine		Incisor		Total		Molars		Canine		Incisors		Total			
Calculus	62		25		18		105		55		12		10		77		182	
none	53	85.5	24	96.0	18	100.0	95	90.5	49	89.1	12	100.0	10	100.0	71	92.2	166	91.2
slight	9	14.5	1	4.0	0	0.0	10	9.5	6	10.9	0	0.0	0	0.0	6	7.8	16	8.8
Hypoplasia	67		29		23		119		62		17		14		93		212	
absent	66	98.5	26	89.7	23	100.0	115	96.6	62	100.0	13	76.5	14	100.0	89	95.7	204	96.2
present	1	1.5	3	10.3	0	0.0	4	3.4	0	0.0	4	23.5	0	0.0	4	4.3	8	3.8
Caries	70		29		23		122		59		14		14		87		209	
absent	67	95.7	27	93.1	23	100.0	117	95.9	59	100.0	14	100.0	14	100.0	87	100.0	204	97.6
present	3	4.3	2	6.9	0	0.0	5	4.1	0	0.0	0	0.0	0	0.0	0	0.0	5	2.4
Abscessing	61		26		27		114		60		22		39		121		235	
present	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Attrition	69		29		24		122		58		13		14		85		207	
none	0	0.0	0	0.0	2	8.3	2	1.6	3	5.2	0	0.0	0	0.0	3	1.0	5	2.4
enamel	55	79.7	18	62.1	14	58.3	87	71.3	42	72.4	10	76.9	2	14.3	54	63.5	141	68.1
dentin	14	20.3	11	37.9	8	33.3	33	27.0	8	13.8	3	23.1	12	85.7	23	27.1	56	27.1
pulp	0	0.0	0	0.0	0	0.0	0	0.0	5	8.6	0	0.0	0	0.0	5	5.9	5	2.4

Note: Representing 32 individuals: 16 male, 12 female, 4 ?sex.

Deciduous Caries

No caries are noted in the Non Nok Tha mandibular deciduous teeth (0/87) [Table 5.42]. Caries are noted in 4.1% (5/122) of the maxillary teeth, in the canines (6.9%, 2/29) and molars (4.3%, 3/70). No caries are noted in the male tooth sample (0/117), while caries occur in 4.2% (3/72) of the female teeth, a significant difference (FET p=0.054, one-tailed probability), as well as 10.0% (2/20) of the ?sex tooth sample.

Table 5.42. Prevalence of Caries, By Sex, in Non Nok Tha Deciduous Teeth

Jaw/Tooth	Male		Female		?Sex		Total	
	A/O	%	A/O	%	A/O	%	A/O	%
Maxilla m2	0/19	0.0	0/13	0.0	1/4	25.0	1/36	2.8
m1	0/17	0.0	1/12	8.3	1/5	20.0	2/34	5.9
c	0/13	0.0	2/12	16.7	0/4	0.0	2/29	6.9
i2	0/8	0.0	0/3	0.0	0/2	0.0	0/13	0.0
i1	0/8	0.0	0/2	0.0			0/10	0.0
Total Maxillary Caries	0/65	0.0	3/42	7.1	2/15	13.3	5/122	4.1
Mandible m2	0/19	0.0	0/9	0.0	0/2	0.0	0/30	0.0
m1	0/16	0.0	0/11	0.0	0/2	0.0	0/29	0.0
c	0/9	0.0	0/4	0.0	0/1	0.0	0/14	0.0
i2	0/4	0.0	0/3	0.0			0/7	0.0
i1	0/4	0.0	0/3	0.0			0/7	0.0
Total Mandibular Caries	0/52	0.0	0/30	0.0	0/5	0.0	0/87	0.0
Total Caries	**0/117**	**0.0**	**3/72**	**4.2**	2/20	10.0	5/209	2.4

Note: A=affected, O=observed, m=deciduous molar, c=deciduous canine, i=deciduous incisor; Includes 26 individuals: 13 males, 10 females, 3 ?sex. **Bold** indicates statistical significance (α=0.10).

Table 5.43. Prevalence of Caries, By Age, in the Non Nok Tha Deciduous Teeth

Jaw/Tooth Class A/O Teeth	Mean Age (in years)											Total	
	<1	1	2	3	4	5	6	7	8	9	10-11	A/O	%
Maxilla molars			1/14	0/20	0/12	0/5	1/4	0/11	0/3	1/1		3/70	4.3
canine			0/7	0/10	0/4	0/2	1/2	0/3		1/1		2/29	6.8
incisors	0/2		0/7	0/9	0/5		0/1					0/24	0.0
Total Maxilla	0/2		0/28	0/39	0/21	0/7	2/6	0/14	0/3	0/2		5/122	4.1
Mandible molars		0/1	0/10	0/22	0/6	0/2	0/1	0/8	0/2	0/3	0/4	0/60	0.0
canines		0/1	0/2	0/6	0/2	0/1		0/2				0/14	0.0
incisors			0/8	0/6								0/14	0.0
Total Mandible		0/2	0/20	0/34	0/8	0/3	0/1	0/10	0/2	0/3	0/4	0/87	0.0
Totai Carious Teeth	0/2	0/2	1/48	0/73	0/29	0/10	2/7	0/24	0/5	2/5	0/4	5/209	2.4
No. of Individuals	0/1	0/1	1/4	0/6	0/4	0/2	1/1	0/4	0/1	1/1	0/1	3/26	11.5

Note: A=affected, O=observed, No.=number. Representing 26 individuals: 13 male, 10 female, 3 ?sex.

The five deciduous caries observed at Non Nok Tha are found in three individuals, giving a mean number of affected teeth per affected person (MATAP) of 1.7 (SD=0.43). Observation of the age distribution of these caries reveals that the three different types of caries are noted at different ages (Table 5.43). The first caries noted in this series, is a huge occlusal caries of the second maxillary molar in a two year old. The next caries are not seen until age six years, when supposed hypoplastic defects of the buccal surface of the maxillary canine and first molar are eroded. Finally, interproximal caries are noted in a nine year old.

There is no change in the prevalence of deciduous caries over time at Non Nok Tha, a finding not surprising given the relative rarity of affected teeth (Table 5.44). The interproximal and gross caries are noted in Early Group individuals (mean number of affected teeth per affected person, MATAP=1.5, SD=0.5), while those caries associated with hypoplasia were noted in the Late Group (MATAP=2, SD=0).

Table 5.44. Summary of Caries by Group in Non Nok Tha Deciduous Teeth

Jaw/Tooth Class	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	p
Maxilla molars	2/42	4.8	1/28	3.6	FET	1.000
canines	1/17	5.9	1/12	8.3	FET	1.000
incisors	0/20	0.0	0/3	0.0		
Total Maxilla	3/79	3.8	2/43	4.7	FET	1.000
Mandible molars	0/30	0.0	0/29	0.0		
canines	0/8	0.0	0/6	0.0		
incisors	0/14	0.0				
Total Mandible	0/52	0.0	0/35	0.0		
Total	3/131	2.3	2/78	2.6	FET	1.000

Note: Early Group includes EP 1-3, MP 1-3; Late Group includes MP 4-8. A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 26 individuals: 15 Early Group, 11 Late Group.

Deciduous Dental Enamel Hypoplasia

The presence of dental enamel hypoplasia was scored on all erupted and loose teeth present in the deciduous tooth sample (Table 5.45). The prevalence of hypoplastic defects in Non Nok Tha deciduous teeth is 3.8% (8/212). In the maxillary teeth, defects are rare in the molars (1.5%, 1/67), and common in the canine teeth (10.3% , 3/29). In the mandible, hypoplastic defects are noted only in the canine teeth (4/17, 23.5%). The prevalence of hypoplasia is nearly equal in the maxillary teeth (3.4%) and the mandibular teeth (4.3%), and is equal in the male (2.5%) and female (2.7%) teeth overall [FET p=1.000]. The prevalence of hypoplasia of the mandibular canines is greater in male teeth (22.2% : 14.3%) than female teeth.

Table 5.45. Prevalence of Hypoplasia, By Sex, in Non Nok Tha Deciduous Teeth

Jaw/Tooth	Male		Female		?Sex		Total	
	A/O	%	A/O	%	A/O	%	A/O	%
Maxilla m2	0/19	0.0	0/10	0.0	0/5	0.0	0/34	0.0
m1	0/17	0.0	0/11	0.0	1/5	20.0	1/33	3.0
c	1/13	7.7	1/11	9.1	1/5	20.0	3/29	10.3
i2	0/8	0.0	0/3	0.0	0/1	0.0	0/12	0.0
i1	0/8	0.0	0/3	0.0			0/11	0.0
Total Maxilla	1/65	1.5	1/38	2.6	2/16	12.5	4/119	3.4
Mandible m2	0/19	0.0	0/9	0.0	0/1	0.0	0/29	0.0
m1	0/17	0.0	0/15	0.0	0/1	0.0	0/33	0.0
c	2/9	22.2	1/7	14.3	1/1	100.0	4/17	23.5
i2	0/4	0.0	0/3	0.0			0/7	0.0
i1	0/4	0.0	0/3	0.0			0/7	0.0
Total Mandible	2/53	3.8	1/37	2.7	1/3	33.3	4/93	4.3
Total Hypoplasia	3/118	2.5	2/75	2.7	3/19	15.8	8/212	3.8

Note: A=affected, O=observed, m=deciduous molar, c=deciduous canine, i=deciduous incisor; Includes 29 individuals: 14 males, 12 females, 3 ?sex.

Only two different types of hypoplastic defect are noted in Non Nok Tha deciduous teeth (Table 5.46), the linear enamel hypoplasia (LEH), and the localized hypoplasia of the primary canine (LHPC). The LHPC is the most prevalent type of defect (62.5%, 5/8), occurring in 71.4% of all hypoplastic canine teeth. No sex associations can be made.

Eighteen individuals have one or more canine teeth which could be observed for LHPC. Of these, five individuals are affected (5/18, 27.8%). The MATAP is 1.2 (6/5), SD=0.32. Two males, two females and two ?sex individuals are affected, making any conclusions regarding sex associations irrelevant.

Table 5.46. Distribution of Non Nok Tha Deciduous Hypoplastic Teeth by Type, Sex and Tooth Class

Tooth Class Hypoplasia Type		Male		Female		?Sex		Total	
		n/A	%	n/A	%	n/A	%	n/A	%
Molars	LEH					1/1	100.0	1/1	100.0
Canines	LEH			1/2	50.0	1/2	50.0	2/7	28.6
	LHPC	3/3	100.0	1/2	50.0	1/2	50.0	5/7	71.4
Total	LEH			1/2	50.0	2/3	66.7	3/8	37.5
	LHPC	3/3	100.0	1/2	50.0	1/3	33.3	5/8	62.5

Note: n=number, A=affected, LEH=linear enamel hypoplasia, LHPC=Localized hypoplasia of the primary canine.

Examining the distribution of hypoplastic defects by age (Table 5.47), shows the first observation at around one year of age in the mandibular deciduous canine teeth. Observed defects in the earliest ages (one through four years) are all in canine teeth, while defects in the molars are not noted until age six years. Seven of the 29 subadults surveyed have a hypoplastic defect of at least one tooth (24.1%).

Table 5.47. Prevalence of Hypoplasia, By Age, in the Non Nok Tha Deciduous Teeth

Jaw/Tooth Class Affected/Observed	Mean Age (in years)											Total	
	<1	1	2	3	4	5	6	7	8	9	10-11	A/O	%
Maxilla molars			0/13	0/18	0/12	0/5	1/4	0/11	0/3	0/1		1/67	1.5
canines		0/1	0/7	1/9	0/4	1/2	1/2	0/3		0/1		3/29	10.3
incisors	0/2	0/1	0/7	0/8	0/5							0/23	0.0
Total Maxilla	0/2	0/2	0/27	1/35	0/21	1/7	2/6	0/14	0/3	0/2		4/119	3.4
Mandible molars		0/5	0/10	0/22	0/6	0/2		0/8	0/2	0/3	0/4	0/62	0.0
canines		1/4	0/2	2/6	0/2	1/1		0/2				4/17	23.5
incisors			0/8	0/6									
Total Mandible		1/9	0/20	2/34	0/8	1/3		0/10	0/2	0/3	0/4	4/93	4.3
Total Hypoplasias	0/2	1/11	0/47	3/69	0/29	2/10	2/6	0/24	0/5	0/5	0/4	8/212	3.8
No. of Individuals	0/1	1/4	1/4	2/6	0/4	1/2	1/1	0/4	0/1	0/1	0/1	7/29	24.1

Note: Representing 29 individuals: 14 males, 12 females, 3 ?sex.

There are more observations of LHPC in the Late Group canines at Non Nok Tha (23.5%) than the Early Group (6.9%) [Table 5.48]. The mean number of affected canines per affected individual in the Early Group is 1 (SD=1), and in the Late Group 1.3 (SD=0.42). Thus, the trend appears to be an increase in LHPC in the later periods at the site. The prevalence of LEH in Non Nok Tha deciduous molars and canines is equal in both the Early and Late Groups (1.0% : 1.4%).

Table 5.48. Summary of Hypoplasia, By Group, in Non Nok Tha Deciduous Teeth

Hypoplasia Type		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	*p*
LHPC	maxillary canines	0/18	0.0	2/11	18.2	FET	0.135
	mandibular canines	2/11	18.2	2/6	33.3	FET	0.584
Total canines		2/29	6.9	4/17	23.5	FET	0.174
LEH	molars	0/75	0.0	1/54	1.9	FET	0.419
	canines	1/29	3.4	0/17	0.0	FET	1.000
Total		1/104	1.0	1/71	1.4	FET	1.000

Note: Early Group includes EP 1-3, MP 1-3; Late Group includes MP 4-8. A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 29 individuals: 18 Early Group, 11 Late Group. **Bold** indicates statistical significance (α=0.10).

Deciduous Dental Attrition

The effects of attrition on the crowns of the deciduous teeth are dependent upon the length of time the tooth remains in the dentition, as well as the quality of the diet (i.e. coarseness, grit, fiber), and the timing of weaning. Table 5.49 summarizes the findings of dental attrition in the Non Nok Tha deciduous tooth sample, scored on a four point scale (none, enamel wear, dentin exposure, pulp exposure). Pulp exposure is seen only in the mandibular molars (8.6%, 5/58).

Table 5.49. Dental Attrition in the Non Nok Tha Deciduous Teeth

Tooth Class Degree	Maxilla								Mandible							
	Male		Female		?Sex		Total		Male		Female		?Sex		Total	
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
m2 none									0/19	0.0	1/9	11.1	0/2	0.0	1/30	3.3
enamel	16/19	84.2	10/11	90.9	4/5	80.0	30/35	85.7	15/19	78.9	7/9	77.8	0/2	0.0	22/30	73.3
dentin	3/19	15.8	1/11	9.1	1/5	20.0	5/35	14.3	2/19	10.5	1/9	11.1	1/2	50.0	4/30	13.3
pulp									2/19	10.5	0/9	0.0	1/2	50.0	3/30	10.0
m1 none									0/16	0.0	2/11	18.2	0/1	0.0	2/28	7.1
enamel	15/17	88.2	7/12	58.3	3/5	60.0	25/34	73.5	14/16	87.5	6/11	54.5	0/1	0.0	20/28	71.4
dentin	2/17	11.8	5/12	41.7	2/5	40.0	9/34	26.5	0/16	0.0	3/11	27.3	1/1	100.0	4/28	14.3
pulp									2/16	12.5	0/11	0.0	0/1	0.0	2/28	7.1
c enamel	12/13	92.3	6/11	54.5	0/5	0.0	18/29	62.1	9/9	100.0	1/3	33.3	0/1	0.0	10/13	76.9
dentin	1/13	7.7	5/11	45.5	5/5	100.0	11/29	37.9	0/9	0.0	2/3	66.7	1/1	100.0	3/13	23.1
i2 none	2/8	25.0	0/4	0.0	0/1	0.0	2/13	15.4								
enamel	6/8	75.0	4/4	100.0	0/1	0.0	10/13	76.9	0/4	0.0	1/3	33.3			1/7	14.3
dentin	0/8	0.0	0/4	0.0	1/1	100.0	1/13	7.7	4/4	100.0	2/3	66.7			6/7	85.7
i1 enamel	2/8	25.0	2/3	66.7			4/11	36.4	0/4	0.0	1/3	33.3			1/7	14.3
dentin	6/8	75.0	1/3	33.3			7/11	63.6	4/4	100.0	2/3	66.7			6/7	85.7
All none	2/65	3.1	0/41	0.0	0/16	0.0	2/122	1.6	0/52	0.0	3/29	10.3	0/4	0.0	3/85	3.5
enamel	51/65	78.5	29/41	70.7	7/16	43.8	87/122	71.3	38/52	73.1	16/29	55.2	0/4	0.0	54/85	63.5
dentin	12/65	18.5	12/41	29.3	9/16	56.3	33/122	27.0	10/52	19.2	10/29	34.5	3/4	75.0	23/85	27.1
pulp									4/52	7.7	0/29	0.0	1/4	25.0	5/85	5.9

Note: A=affected, O=observed. Representing 27 individual burials: 13 males, 11 females, 3 ?sex. Deciduous teeth are shown in lower case.

In the maxilla, dentin exposure is most common in the central incisors (63.6%) and canines (37.9%); while in the mandible the lateral (85.7%) and central (85.7%) incisors are most often affected. Overall, the amount of advanced attrition (dentin and pulp) in the maxilla (27.0%) is nearly equal that in the mandible (32.9%).

Female deciduous teeth have more advanced wear in the maxilla (29.3%) than male teeth (18.5%). It is male mandibular molars which have pulp exposure, but overall, female teeth have more advanced wear (34.5%) than male teeth (26.9%). Since attrition is a function of age, the distribution of dental attrition by age in the male and female teeth should be examined (Table 5.50). The sample sizes (both teeth and individuals) are quite small for each mean age, but a general trend may be evident. Approximately 84% of the male teeth and 72.9% of the female tooth sample are less than age five years, suggesting that the age distribution of the two samples is quite comparable, and supporting a real difference in tooth wear. The earliest occurrence of dentin exposure in the deciduous teeth occurs in both male and female anterior teeth (incisors and canines) at age two years. Pulp exposure is noted at age 10-11 years.

Table 5.50. Summary of Dental Attrition By Age and Sex in Non Nok Tha Deciduous Teeth

Sex Teeth A/O		Age Interval in Years											Total	
		<1	1	2	3	4	5	6	7	8	9	10-11	A/O	%
Male	Individuals	1	0	2	4	2	0	0	2	1	0	1	13	
	None	2/2											2/117	1.7
	Enamel			23/29	39/47	20/20			7/10				89/117	76.1
	Dentin			6/29	8/47				3/10	5/5			22/117	18.8
	Pulp											4/4	4/117	3.4
Female	Individuals	0	2	2	2	1	1	0	2	0	1	0	11	
	None		1/2	2/17									3/70	4.3
	Enamel		1/2	8/17	26/26	2/2	3/4		4/14		1/5		45/70	64.3
	Dentin			7/17			1/4		10/14		4/5		22/70	31.4
?Sex	Individuals	0	0	0	0	1	1	1	0	0	0	0	3	
	None					4/7		3/7					7/20	35.0
	Enamel					3/7	6/6	3/7					12/20	60.0
	Dentin							1/7					1/20	5.0

Note: A=affected, O=observed. Representing 27 individuals: 13 males, 11 females, 3? sex.

There is significantly greater attrition of all degrees in the Late Group deciduous teeth (39.7%, 31/78) at Non Nok Tha than in the Early Group (23.3%, 30/129) [χ^2=6.358, df=1, p=0.012]. Examining the distribution by age (Table 5.51), however, it is apparent, that the Late Group dental sample is from older individuals, so the difference is expected. More than 85% (110/129) of the Early Group tooth sample is from individuals less than five years, while only 53.8% (42/78) of the Late Group sample is equally aged. It is noteworthy perhaps, that the first observed dentin exposure in the Early Group is at age two years, while in the Late Group sample, it is not until age three years. In addition, there is no pulp exposure observed in the Early Group deciduous teeth. These differences may suggest changes in weaning patterns or weaning foods.

Table 5.51. Prevalence of Dental Attrition, By Age and Group, in the Non Nok Tha Deciduous Teeth

Group/Degree Teeth Affected		Mean Age (in years)								
		1	2	3	4	5	6	7	8-9	10-11
Early	Observed	4	36	43	27	4	0	10	5	0
	None	75.0	5.6							
	Enamel	25.0	58.3	86.0	88.9	75.0		70.0	20.0	
	Dentin		36.1	14.0	11.1	25.0		30.0	80.0	
Late	Observed	0	10	30	2	6	7	14	5	4
	Enamel		100.0	93.3	100.0		42.9	28.6		
	Dentin			6.7		100.0	42.9	71.4	100.0	
	Pulp						14.3			100.0

Note: A=affected, O=observed. Representing 27 individuals: 16 Early Group, 11 Late Group.

Deciduous Dental Calculus

Dental calculus, of slight degree, is noted in 8.8% (16/182) of the deciduous teeth from Non Nok Tha (Table 5.52). Calculus is noted predominately on molar teeth, and is slightly more common in the maxillary teeth (9.5%, 10/105) than in the mandibular teeth (7.7%, 6/77). The prevalence of calculus is greater in female teeth than male teeth in the maxilla (11.4% : 5.3%), mandible (18.2% : 3.9%), and overall (14.0% : 4.6%), the latter differences are statistically significant.

Table 5.52. Prevalence of Slight Dental Calculus, By Sex, in Non Nok Tha Deciduous Teeth

Jaw/Tooth Class Slight calculus	Male		Female		Statistic		?Sex	
	A/O	%	A/0	%	Test	*p*	A/O	%
Maxilla molars	3/33	9.1	4/21	19.0			2/8	25.0
canines	0/11	0.0	0/9	0.0			1/5	20.0
incisors	0/13	0.0	0/5	0.0				
Total	3/57	5.3	4/35	11.4	FET	0.245	3/13	23.1
Mandible molars	2/35	5.7	4/17	23.5			0/3	0.0
canines	0/8	0.0	0/3	0.0			0/1	0.0
incisors	0/8	0.0	0/2	0.0				
Total	**2/51**	**3.9**	**4/22**	**18.2**	**FET**	**0.063**	0/4	0.0
All Teeth	**5/108**	**4.6**	**8/57**	**14.0**	**FET**	**0.036**	3/17	17.6

Note: A=affected, O=observed, FET=Fisher's Exact Test, one-tailed probabilities. Represents 24 burials: 12 males, 9 females, 3 ?sex. **Bold** indicates statistical significance (α=0.10).

Although the tooth sample is small, examining the prevalence of calculus by age (Table 5.53) suggests that calculus is noted earlier in female teeth (ages two and three) than in male teeth (age eight). As would be expected, calculus is first seen in maxillary molars at age two and in the mandible at approximately age three. The majority of the calculus in this series is noted in the two to four year age interval (11/129, 8.5%).

Table 5.53. Summary of Slight Dental Calculus By Age, Jaw and Sex in Non Nok Tha Deciduous Teeth

Sex/Jaw Slight Calculus		Mean Age (in years)										Total	
		1	2	3	4	5	6	7	8	9	10-11	A/O	%
Male	A/O		0/28	0/41	0/20			0/10	5/5		0/4	5/108	4.6
	%								100.0				
Female	A/O	0/1	4/8	4/26	0/2	0/4		0/14		0/2		8/57	14.0
	%		50.0	15.4									
?Sex	A/O				3/4	0/6	0/7					3/17	17.6
	%				75.0								
Maxilla	A/O		4/24	0/33	3/18	0/7	0/6	0/14	3/3			10/105	9.5
	%		16.7		16.7				100.0				
Mandible	A/O	0/1	0/12	4/34	0/8	0/3	0/1	0/10	2/2	0/2	0/4	6/77	7.8
	%			11.8					100.0				
Total	A/O	0/1	4/36	4/67	3/26	0/10	0/7	0/24	5/5	0/2	0/4	16/182	8.8
	%		11.1	6.0	11.5				100.0				

Note: A=affected, O=observed. Representing 24 individuals: 12 males, 9 females and 3 ?sex.

The slight calculus noted in the Non Nok Tha deciduous dentitions is more common in the Late Group (9/72, 12.5%) than the Early Group (7/110, 6.4%), but the difference is not statistically significant (χ^2=2.044, df=1, p=0.153). Examining the distribution of calculus, by age and group (Table 5.54) documents the first observations of calculus in the Early Group at age two years, and one year later in the Late Group. Controlling for the age interval two to four years, calculus is noted in 7/93 (7.5%) of the Early Group teeth, and 11.1% (4/36) of the Late Group teeth (FET p=0.499), suggesting that there is no significant difference between the two groups.

Table 5.54. Slight Calculus, By Age and Group, in the Non Nok Tha Deciduous Teeth

Group	Mean Age (in years)									
	1	2	3	4	5	6	7	8	9	10-11
Early A/O	0/1	4/26	0/43	3/24	0/4		0/10		0/2	
%		15.4		12.5						
Late A/O		0/10	4/20	0/2	0/6	0/7	0/14	5/5		0/4
%			16.7					100.0		

Note: Representing 21 individuals: 10 Early Group, 11 Late Group.

Summary of Deciduous Oral Health

In summary, pathology of the deciduous teeth from Non Nok Tha is fairly uncommon. There are five caries in this sample, giving an overall caries prevalence of 2.4% (5/209) of deciduous teeth. There is a significant difference in the prevalence of caries in female teeth (4.2%) and male teeth (0.0%), but the presence of caries in 10.0% of the ?sex teeth, may offset this. The mean number of carious teeth per affected individual is 1.7 (SD=0.43). Only 3.8% of the deciduous teeth are noted to have hypoplastic defects of the enamel, most commonly of the canine teeth (7/46, 15.2%). Two types of hypoplastic defects are found in these dental remains, linear enamel hypoplasia (LEH), and the most common defect: localized hypoplasia of the primary canine (LHPC). No sex differences in the prevalence of either of these defects was found.

Dental wear exposing the dentin is most common in the anterior teeth of both jaws. Dentin exposure is noted in 27.1% of all teeth, with pulp exposure in 5.9% and enamel wear in 63.5%. Female deciduous teeth have more advanced wear (dentin and pulp exposure) than male teeth (34.5% : 26.9%). Slight dental calculus is recorded in 8.8% of the deciduous teeth available for observation. There is more calculus in female teeth (14.0%) than male teeth (4.6%).

Table 5.55. Summary of Dental Pathology by Group in Non Nok Tha Deciduous Teeth

Pathology	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	p
Caries Teeth	3/131	2.3	2/78	2.6	FET	1.000
MATAP	1.5	SD=0.5	2	SD=0		
LHPC (Canines only)	2/29	6.9	4/17	23.5	FET	1.000
MATAP	1	SD=1	1.3	SD=0.42		
Attrition (Advanced*)	**30/129**	**23.3**	**37/78**	**39.7**	χ^2**=6.358**	**0.012**
Calculus (Slight degree)	7/110	6.4	9/72	12.5	χ^2=2.044	0.153

Note: Early Group includes EP 1-3, MP 1-3; Late Group includes MP 4-8. A=affected, O=observed, MATAP=mean number of affected teeth per affected individual, SD=standard deviation. *Advanced attrition includes dentin and pulp exposure. **Bold** indicates statistical significance (α=0.10).

Temporal changes in deciduous dental pathology are difficult to assess because of the generally low prevalence of most indicators (Table 5.55). No statistically significant temporal changes in the prevalence of caries, LHPC, or slight calculus are found, although, there is an increase in all of these pathologies in the Late Group. The increase in advanced dental attrition, which is in part related to an older age-at-death sample in the Late Group, may also suggest an earlier age at weaning and/or a coarser diet. The increase in LHPC suggests a decrease in calcium availability to the infant, resulting in thinned alveolar bone, or a change in mouthing habits perhaps consistent with earlier weaning.

ADULT DENTAL PATHOLOGY

Premortem Tooth Loss

Premortem tooth loss scored by tooth or tooth socket, is uncommon in the Non Nok Tha dental remains (7.4%, 125/1698) [Table B.29]. Tooth loss is greater in the mandible (9.7%) than the maxilla (4.8%), and greater in the posterior teeth (88/1068, 8.2%) than the anterior teeth (37/630, 5.9%). One characteristic of the dental sample at Non Nok Tha, is the great prevalence of broken teeth, although the scoring system used was inadequate to record this feature. It is impossible to determine if the broken teeth are, as proposed by Sangvichien et al. (1964), evidence of attempted tooth ablation, or were broken during disturbance, excavation, cleaning and/or handling. Because of this problem, no effort has been made to distinguish broken teeth from present teeth. No teeth are lost in individuals less than 15 years of age (Table 5.56).

Table 5.56. Premortem Tooth Loss in Non Nok Tha Subadult (<15 Years) Permanent Teeth

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/5		0/1	0/5	0/11	0/8		0/1	0/2	0/11	0/22
Female	0/6	0/2	0/1	0/4	0/13	0/11	0/4	0/4	0/11	0/30	0/43
? Sex	0/1				0/1	0/2			0/2	0/4	0/5
Total	0/12	0/2	0/2	0/9	0/25	0/21	0/4	0/5	0/15	0/45	0/70

Note: M=molar, P=premolar, C=canine, I=incisor. 14 individual burials (6 males, 5 females, 3 ?sex) are represented.

Premortem tooth loss is greater in male maxillary teeth (5.7% : 4.0%) and in male mandibular teeth (12.3% : 7.0%), than in the female teeth respectively (Table 5.57). The difference is statistically significant in the mandibular molars, all mandibular teeth, as well as overall (9.1% : 5.5%). The majority of this sex difference appears to be in the prevalence of premortem loss of the mandibular molars and incisors in males (14/112), in contrast to that in females (6/95). These 14 incisors are lost from six male burials, always in the presence of other tooth loss except in one individual, which suggests the absence of deliberate tooth evulsion as the cause.

Table 5.57. Prevalence of Premortem Tooth Loss, By Sex, in Adult (>15 years) Permanent Teeth

Jaw/Tooth Class	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	10/137	7.3	10/143	7.0	χ^2=0.010	0.921
Premolars	5/112	4.5	1/113	0.9	FET	0.119
Canine	2/55	3.6	3/50	6.0	FET	0.667
Incisors	6/103	5.8	2/98	2.0	FET	0.280
Total Maxillary Tooth Loss	23/407	5.7	16/404	4.0	χ^2=1.266	0.261
Mandible Molars	**31/167**	**18.6**	**19/167**	**11.4**	**χ^2=3.387**	**0.066**
Premolars	7/116	6.0	5/113	4.4	χ^2=0.299	0.585
Canine	4/62	6.5	0/55	0.0	FET	0.121
Incisors	14/112	12.5	6/95	6.3	χ^2=2.252	0.133
Total Mandibular Tooth Loss	**56/457**	**12.3**	**30/430**	**7.0**	**χ^2=7.046**	**0.008**
Total Tooth Loss	**79/864**	**9.1**	**46/834**	**5.5**	**χ^2=8.190**	**0.004**

Note: A=affected, O=observed, FET=Fisher's Exact Test, 2-tailed probabilities. Includes 82 individuals: 40 males, 42 females; 80 adults (>20 years), 2 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Examining the occurrence of tooth loss in the sub-sample of Non Nok Tha skeletons with five year age-intervals (Table 5.58), documents the earliest tooth loss occurs in females, and is noted in the youngest age intervals. This sub-sample of the Non Nok Tha dental

Table 5.58. Summary of Premortem Tooth Loss by Age and Sex in Non Nok Tha Permanent Teeth (Individuals >15 years of age)

Sex Jaw		Age Interval in Years									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Male	Individuals	1	2	2	3	10	4	5	1	7	35
	A/O	0/29	0/47	0/57	0/70	8/244	6/121	11/83	7/21	42/145	74/817
	%	0.0	0.0	0.0	0.0	3.3	5.0	13.3	33.3	29.0	9.1
Female	Individuals	3	4	5	2	5	10	1	3	3	36
	A/0	*3/78	†2/85	0/124	‡1/47	8/111	12/215	0/16	7/69	12/35	45/780
	%	3.8	2.4	0.0	2.1	7.2	5.6	0.0	10.1	34.3	5.8
Maxilla	A/O	*3/59	0/56	0/104	‡1/66	4/171	10/169	0/40	4/45	16/71	38/781
	%	5.1	0.0	0.0	1.5	2.3	5.9	0.0	8.9	22.5	4.9
Mandible	A/O	0/48	†2/76	0/77	0/51	12/184	8/167	11/59	10/45	38/109	81/816
	%	0.0	2.6	0.0	0.0	6.5	4.8	18.6	22.2	34.9	9.9
Total	Individuals	4	6	7	5	15	14	6	4	10	71
	A/O	*3/107	†2/132	0/181	‡1/117	16/355	18/336	11/99	14/90	54/180	119/1597
	%	2.8	1.5	0.0	0.9	4.5	5.4	11.1	15.6	30.0	7.5

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 35 males, 36 females and 1 ?sex individual. *Three teeth in a single individual which are presumed to be ablation. † A fourth premolar and second molar in two individuals. ‡A third molar.

sample, is lacking 11 individuals representing six lost teeth, and 101 sockets examined. The three teeth lost in the 15-20 year interval (single individual) are a possible case of ablation; the two teeth lost in the 20-24 year interval (two individuals) are a second molar and fourth premolar; and the single tooth lost in the 30-35 year interval is also a molar. In the later age intervals, the distribution of tooth loss appears approximately the same in both sexes.

The greater tooth loss in the mandible is reflected in a uniformly greater number of teeth lost within each age category, with no obvious differences. Finally, in the overall figures, it is evident that prior to age 35, premortem tooth loss is uncommon (6/537, 1.1%), and increases steadily after that.

Attempting to examine the Non Nok Tha sample of premortem loss by individual (a difficult issue because of the problems of incomplete dentitions), it is apparent that most individuals have lost more than one tooth. Of the 82 individual burials, 33 have premortem tooth loss (40.2%). Thirty-three percent of those (11/33) have premortem loss of a single tooth, 16 (48.5%) have lost from two to five teeth, and the remaining six individuals (18.2%) have lost in excess of five teeth. Thus, the mean tooth loss per individual [MATAP] is 125/33, or 3.9 teeth; or in all individuals 125/82 (1.5 teeth).

Premortem Tooth Loss Over Time

Since there were significant sex differences in the prevalence of premortem tooth loss in the Non Nok Tha dental sample, examining for sex differences in the group sub-samples is required (Table 5.59). In the Early Group at the site, premortem loss in the male teeth (7.4%) is significantly greater than in the female teeth (3.1%). Most of this difference can be attributed to the frequency of male mandibular incisor tooth loss (14.9%) which is quadruple that in females (3.6%), and to loss of the mandibular molars (15.9% : 4.2%).

Table 5.59. Premortem Tooth Loss, By Sex and Group in Adult and Adolescent (>15 years) Permanent Teeth from Non Nok Tha

(# of Individuals) Affected/Observed teeth Jaw/Tooth Class	Early Group (EP 1-3, MP 1-3)						Late Group (MP 4-8)					
	Male (16)		Female (22)		Statistic		Male (22)		Female (19)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla Molars	3/65	4.6	6/92	6.5	FET	0.737	7/69	10.1	4/48	8.3	FET	1.000
Premolars	0/46	0.0	1/72	1.4	FET	1.000	5/64	7.8	0/39	0.0	FET	0.154
Canines	0/24	0.0	1/35	2.9	FET	1.000	2/30	6.7	2/14	14.3	FET	0.581
Incisors	0/44	0.0	1/63	1.6	FET	1.000	6/57	10.5	1/33	3.0	FET	0.416
Maxillary Tooth Loss	3/179	1.7	9/262	3.4	FET	0.375	20/220	9.1	7/134	5.2	χ^2=1.768	0.184
Mandible Molars	**13/82**	**15.9**	**4/96**	**4.2**	**χ^2=6.993**	**0.008**	18/79	22.8	15/71	21.1	χ^2=0.060	0.807
Premolars	4/55	7.3	1/65	1.5	FET	0.178	3/57	5.3	4/48	8.3	FET	0.700
Canines	2/28	7.1	0/30	0.0	FET	0.229	2/32	6.3	0/25	0.0	FET	0.499
Incisors	**7/47**	**14.9**	**2/56**	**3.6**	**FET**	**0.076**	7/61	11.5	4/39	10.3	FET	1.000
Mandibular Tooth Loss	**26/212**	**12.3**	**7/247**	**2.8**	**χ^2=15.20**	**0.000**	30/229	13.1	23/183	12.6	χ^2=0.026	0.873
Total Premortem Loss	**29/391**	**7.4**	**16/509**	**3.1**	**χ^2=8.502**	**0.004**	50/449	11.1	**30/317**	**9.5**	χ^2=0.555	0.456

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). Represents 79 individuals. **Bold indicates statistical significance (α=0.10).**

In the Late Group, there are no significant differences between the sexes in the prevalence of premortem tooth loss, although loss in male teeth (11.1%) is greater than in female teeth (9.5%).

Following the prevalence of premortem tooth loss in males through time, it is evident that there is a large increase in loss of maxillary teeth in the Late Group (1.7% : 9.1%). This difference is significant (χ^2=9.990, p=0.002), and appears to result from an increase in loss of the anterior teeth. In the male mandibular teeth, loss remains fairly constant (12.3% : 13.1%), but overall, there is a significant increase in the Late Group (7.4% : 11.1%, χ^2=3.393, p=0.065).

Table 5.60. Premortem Tooth Loss by Group in Non Nok Tha Permanent Teeth (>15 years)

Jaw/Tooth Class	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	p
Maxilla Molars	9/157	5.7	11/117	9.4	χ^2=1.334	0.248
Premolars	1/118	0.8	5/103	4.9	FET	0.100
Canines	1/59	1.7	4/44	9.1	FET	0.161
Incisors	**1/107**	**0.9**	**7/90**	**7.8**	**FET**	**0.025**
Total Maxilla	**12/441**	**2.7**	**27/354**	**7.6**	**χ^2=10.13**	**0.001**
Mandible Molars	**17/178**	**9.6**	**33/150**	**22.0**	**χ^2=9.765**	**0.002**
Premolars	5/120	4.2	7/105	6.7	χ^2=0.693	0.405
Canines	2/58	3.4	2/57	3.5	FET	1.000
Incisors	9/103	8.7	11/100	11.0	χ^2=0.292	0.589
Total Mandible	**33/459**	**7.2**	**53/412**	**12.9**	**χ^2=7.856**	**0.005**
Total	**45/900**	**5.0**	**80/766**	**10.4**	**χ^2=17.67**	**0.000**

Note: Early Group includes EP 1-3 and MP 1-3, Late Group includes MP 4-8. A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 79 individuals: 38 males, 41 females. **Bold** indicates statistical significance (α=0.10).

Female premortem tooth loss also increases in the Late Group (3.1% : 9.5%), a difference which is significant (χ^2=14.838, p=0.000), and which can be attributed to a significant increase in tooth loss in the mandible (2.8% : 12.6%; χ^2=15.348, p=0.000). This increase is attributable to an increase in loss of the posterior teeth and the mandibular incisors.

The prevalence of premortem tooth loss increases over time in the combined Non Nok Tha sample (Table 5.60), and is statistically significant in the maxillary incisors, mandibular molars, all maxillary, all mandibular, and all teeth. The prevalence of premortem tooth loss doubles in the Late Group (5.0% : 10.4%), and as discussed above, can be attributed to an increase in male maxillary incisor loss, and female mandibular molar loss. This is a rather enigmatic pattern, perhaps a result of increased use of the anterior teeth as tools in males.

Examining the age distribution of tooth loss, by group (Table 5.61) might suggest further explanations. Again, this is a sub-sample, comprised of 69 individuals (less 13 individuals), 1573 teeth (less 125 teeth), and 119 affected teeth (less 6 teeth). There is slightly more tooth loss in the early age intervals (<35 years) in the Early Group (0.9%) than in the Late Group (0.6%). The frequency of lost teeth is higher in the early middle-age intervals (35-45 years) in the Late Group, likely contributing to the overall frequency of loss.

Table 5.61. Summary of Premortem Tooth Loss By Group and Age in Non Nok Tha Permanent Teeth

Age Category*	Early Group (EP, MP 1-3)			Late Group (MP 4 - 8)			Statistic
	A/O	%	# Indiv.	A/O	%	# Indiv.	
Young	5/352‡	1.4	13	1/169	0.6	8	FET 0.669
Middle	7/358	2.0	15	38/432	8.8	20	**χ^2=17.055 p=0.000**
Old	28/150	18.7	6	40/112	35.7	7	**χ^2=9.697 p=0.002**
Total	40/860	4.7	34	79/713	11.1	35	

* Only individuals with specific (5 year interval) age estimates are included here: 23 males, 24 females and 1 ?sex individual. Young adult (15-35 years), Middle-age (35-50 years), Old (50+ years). Note: A=affected, O=observed. ‡ Possible ablation in three of these teeth.

Summary of Premortem Tooth Loss

Premortem tooth loss is rare in the Non Nok Tha adult permanent tooth sockets (7.4%, 125/1698). Premortem tooth loss is significantly more common in male teeth (9.1%) than female teeth (5.5%), a difference which is attributable to the greater prevalence of loss of the anterior teeth of both jaws in males. Premortem tooth loss is uncommon in either sex before the age of 35 years. The prevalence of premortem tooth loss increases over time in both male teeth (7.4% : 11.1%) and female teeth (3.1% : 9.5%), contributing to a significant increase when the sexes are combined (5.0% : 10.4%). While premortem loss increases in all tooth classes, there are significant increases in maxillary tooth loss in males and mandibular tooth loss in females.

Adult Caries

Caries of the permanent teeth are not found in individuals less than 15 years of age (N=13; 0/52) at Non Nok Tha (Table 5.62). Following previous dental pathology discussions, permanent teeth in subadults aged 15 to 20 will be combined with adults in the remaining discussion.

Table 5.62. Caries in Non Nok Tha Subadult (<15 Years) Permanent Teeth

Sex A/O	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/3		0/1	0/3	0/7	0/5		0/1	0/2	0/8	0/15
Female	0/5	0/2	0/1	0/2	0/10	0/8	0/4	0/2	0/10	0/24	0/34
? Sex						0/2			0/1	0/3	0/3
Total	0/8	0/2	0/2	0/5	0/17	0/15	0/4	0/3	0/13	0/35	0/52

Note: 9 individual burials (4 males, 4 females, 1 unknown sex) are represented. A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor.

The distribution of caries, by tooth and origin, is presented in Table B.30 and summarized in Table 5.63 below. Caries are rare in the Non Nok Tha adult permanent teeth (2.8%, 34/1233). Caries are slightly more common in the mandibular teeth (3.2%, 20/634) than in the maxillary teeth (2.3%, 14/399). The molar teeth of both jaws are most frequently affected, with rare caries in the premolars and anterior teeth. In contrast to Ban Chiang, caries are more common in female teeth (3.1%, 20/636) than in male teeth (2.3%, 14/597) at Non Nok Tha, a difference which is reflected less in the maxillary teeth (2.6% : 2.1%) than in the mandibular teeth (3.7% : 2.6%). None of the sex differences is statistically significant (α=0.10).

Table 5.63. Prevalence of Caries, By Sex, in Non Nok Tha Permanent Teeth (Individuals > 15 years)

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	*p*
Maxilla M3	1/23	4.3	2/26	7.7	FET	1.000
M2	2/42	4.8	4/46	8.7	FET	0.678
M1	2/45	4.4	0/53	0.0	FET	0.208
P4	0/45	0.0	1/52	1.9	FET	1.000
P3	0/46	0.0	0/46	0.0		
C	0/36	0.0	0/35	0.0		
I2	0/25	0.0	0/28	0.0		
I1	1/24	4.2	1/27	3.7	FET	1.000
Total Maxillary Caries	6/286	2.1	8/313	2.6	χ^2=0.137	0.711
Mandible M3	0/39	0.0	5/40	12.5	**FET**	**0.055**
M2	3/47	6.4	3/48	6.3	FET	1.000
M1	1/42	2.4	2/51	3.9	FET	1.000
P4	1/42	2.4	1/46	2.2	FET	1.000
P3	2/44	4.5	1/41	2.4	FET	1.000
C	1/46	2.2	0/42	0.0	FET	1.000
I2	0/30	0.0	0/30	0.0		
I1	0/21	0.0	0/25	0.0		
Total Mandibular Caries	8/311	2.6	12/323	3.7	χ^2=0.677	0.411
Total Caries	14/597	2.3	20/636	3.1	χ^2=0.734	0.392

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test (2-tailed probabilities). Includes 80 individuals: 38 males, 42 females; 77 adults (>20 years), 4 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

Comparing caries origins between the sexes in Table 5.64, in the maxilla, male caries are more often interproximal (50.0%, 3/6), while huge caries (37.5%, 3/8) are more common in females. In the mandible, both male (50.0%, 4/8) and female (33.3%, 4/12) caries are most often interproximal in origin. There are no obvious patterns of origin in the molar class of teeth in either the maxilla or mandible, and caries in the premolars and anterior teeth are either absent or non-variable. Collapsing the origin categories into occlusal/non-occlusal, and omitting the huge caries from analysis; no statistically significant differences are found in the maxillary caries totals (FET p =1.000) or mandibular caries totals (FET p=1.000).

Table 5.64. Non Nok Tha Permanent Tooth Caries By Type, Jaw, Sex, and Tooth Class

Tooth Class/ Caries Type		Maxilla				Mandible			
		Male		Female		Male		Female	
		n/A	%	n/A	%	n/A	%	n/A	%
Molar	Occlusal	1/5	20.0	1/7	14.3	2/4	50.0	3/10	30.0
	Interproximal	3/5	60.0	1/7	14.3	0/4	0.0	2/10	20.0
	Crown	0/5	0.0	1/7	14.3	1/4	25.0	2/10	20.0
	Huge	2/5	40.0	4/7	57.1	1/4	25.0	3/10	30.0
Premolar	Interproximal			1/1	100.0	3/3	100.0	2/2	100.0
Canine	Interproximal					1/1	100.0		
Incisor	Occlusal	0/1	0.0	1/1	100.0				
	Interproximal	1/1	100.0	0/1	0.0				
Total	Occlusal	1/6	16.7	2/8	25.0	2/8	25.0	3/12	25.0
	Crown	0/6	0.0	1/8	12.5	1/8	12.5	2/12	16.7
	Interproximal	3/6	50.0	2/8	25.0	4/8	50.0	4/12	33.3
	Huge	2/6	33.3	3/8	37.5	1/8	12.5	3/12	25.0

Note: CEJ=cemento-enamel junction, n=number, A=affected.

Table 5.65. Summary of Caries Frequency by Age in Non Nok Tha Adolescent (>15 years) and Adult Permanent Teeth

Tooth	Age Interval in Years (No of Individuals)									Total (70)	
MAX	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (15)	40-45 (14)	45-50 (6)	50-55 (4)	55-60 (9)		
M3	0/3	0/5	0/10	0/5	0/7	1/10	0/1	1/2	1/4	3/47	6.4
M2	2/8	0/7	0/13	0/7	2/19	1/19	0/2	0/3	0/7	5/85	5.9
M1	0/8	0/7	0/13	0/8	2/22	0/21	0/2	0/5	0/7	2/93	2.2
Premolars	0/15	0/14	0/25	0/16	0/40	1/40	0/9	0/11	0/12	1/182	0.5
Canine	0/7	0/4	0/10	0/8	0/15	0/13	0/3	0/5	0/4	0/69	0.0
Incisors	0/6	0/8	0/20	0/9	0/23	2/18	0/4	0/5	0/6	2/99	4.2
Total	2/47 4.3%	0/45 0.0%	0/91 0.0%	0/53 0.0%	4/126 3.2%	5/121 4.1%	0/21 0.0%	1/31 3.2%	1/40 2.5%	13/575	2.3
MAND											
M3	0/3	0/7	1/9	0/6	1/20	2/15	0/4	0/2	0/5	4/71	5.6
M2	0/6	0/9	1/10	0/7	1/21	3/21	0/4	1/5	0/7	6/90	6.7
M1	0/6	1/10	1/10	0/6	0/21	0/18	0/4	0/4	0/4	2/83	2.4
Premolars	0/11	0/18	0/14	0/9	0/37	2/35	1/6	2/11	0/15	5/156	3.2
Canine	0/5	0/9	0/6	0/5	0/23	0/17	0/3	0/5	0/9	0/82	0.0
Incisors	0/5	0/10	0/9	0/6	0/30	0/18	0/11	0/6	0/3	0/98	0.0
Total	0/36 0.0%	1/63 1.6%	3/58 5.2%	0/39 0.0%	2/152 1.3%	7/124 5.6%	1/32 3.1%	3/33 9.1%	0/43 0.0%	17/580	2.9
TOTAL	2/83 2.4%	1/108 0.9%	3/149 2.0%	0/92 0.0%	6/278 2.2%	12/245 4.9%	1/53 1.9%	4/64 6.3%	1/83 1.2%	30/1155	2.6

Note: Only individuals with narrow age estimates were used in this table (N=70; 34 males, 36 females).

Caries frequency by age in the Non Nok Tha dental sample of individuals with specific age interval estimates (N=70), Table 5.65, documents the highest prevalence of caries in the maxillary teeth in the 15-20 year age interval (4.3%), followed by the 40-45 year interval (4.1%). In the mandible, caries prevalence is highest in the 50-55 year interval (9.1%), followed by the 40-45 year interval (5.6%). Both jaws exhibit a very low caries frequency prior to 40-45 years, with those caries present only in the molars. Combining jaws, caries are most common in the 50-55 year interval (6.3%) followed by the 40-45 year age interval (4.9%).

Table 5.66. Caries Origin by Age in Non Nok Tha Permanent Teeth (Individuals >15 years of age)

Caries Origin	Age Interval in Years (Number of Individuals)								
No. Present	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (15)	40-45 (14)	45-50 (6)	50-55 (4)	55-60 (9)
Occlusal	1	0	2		1	2	0	1	0
Interproximal	0	0	0		2	7	1	2	0
Crown	0	1	1		1	0	0	0	0
Huge	1	0	0		2	3	0	1	1
Total (30) % of total	2 6.7%	1 3.3%	3 10.0%	0 0.0%	6 20.0%	12 40.0%	1 3.3%	4 13.3%	1 3.3%

Note: Only burials with specific (5 year interval) age estimates are included here: 34 males, 36 females.

Examining caries origins by age (Table 5.66), sites on the occlusal and crown surface are susceptible to carious destruction at earlier ages than the interproximal surfaces of the tooth. Huge caries are infrequent in younger individuals, likely because of the amount of time necessary for complete crown destruction. Forty percent of all caries (12/30) are recorded in the 40-45 year age interval.

Table 5.67. Caries Prevalence by Age and Sex in Non Nok Tha Permanent Teeth

Sex	Age Interval in Years (# of Individuals)								
A/O Teeth (# individuals)	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (15)	40-45 (14)	45-50 (6)	50-55 (4)	55-60 (9)
Male	0/23 (1)	0/46 (2)	0/38 (2)	0/50 (3)	5/188 (10)	2/98 (4)	1/40 (5)	3/14 (1)	1/70 (6)
Female	2/60 (3)	1/62 (4)	3/111 (5)	0/42 (2)	1/90 (5)	10/147 (10)	0/13 (1)	1/50 (3)	0/13 (3)

Note: A=affected, O=observed. Only burials with specific (5 year interval) age estimates are included here (N=70): 34 males, 36 females.

The small number of caries, and the small number of male individuals in the younger age intervals in the sample from Non Nok Tha, makes conclusions about caries occurrence by age and sex (Table 5.67) tentative. However, there is an apparent lack of caries in males prior to the age of 35 years, while in females, one-third of the caries (6/18, 33.3%) are found in those aged less than 35 years. In both sexes, a declining number of caries are noted in the later age intervals.

To summarize, caries are uncommon in the Non Nok Tha permanent teeth (2.8%, 34/1233) and are more common in Non Nok Tha female teeth (3.1%, 20/636) than male teeth (2.3%, 14/597), although the differences are not statistically significant. Caries are commonly interproximal in origin (13/34, 38.2%) with occlusal (23.5%, 8/34) and huge (9/34, 26.5%) following. There are no obvious sex differences in caries origin. Caries are infrequent until the middle-age intervals and occur earlier in females than in males. Interproximal caries appear to be caries of older age intervals, while occlusal surface caries are noted in the young.

Temporal Comparisons of Caries

Temporal comparisons of the Non Nok Tha material must be done with a sub-sample of the burials, because of problems in associating burials in the recent research with confirmed proveniences from the 1966 excavations. Ten individual burials are omitted from all temporal analysis (See Tables B.17 and B.18; Burials 1-12A, 1-22A, 1-30A, 1-43A, 1-77A, 1-38, 1-62, 1-64, 1-70, and 1-80), reducing the available sample from 80 to 76 individuals: 37 in the Early Group (16 males, 21 females) and 39 in the Late Group (20 males and 19 females). The total number of caries in the temporal sample is 33/1205 (2.7%), a decline of 28 teeth, including one carious tooth, from the whole Non Nok Tha sample.

A summary of the caries distribution, by tooth, sex and group, is presented in Table 5.68 below. This distribution examines the presence of sex differences in caries prevalence within each group. In the Early Group, female maxillary teeth have a higher frequency of caries than male teeth (1.1% : 0.0%), a difference which is reversed in the mandible (1.6% : 3.9%), but which evens out in the summed jaw totals (1.3% : 2.1%). None of the sex differences is statistically significant in the Early Group.

In the Late Group, caries prevalence in the maxillary teeth is approximately equal in males (4.0%) and females (4.4%). However, in the mandible, the number of female caries is greater (6.9%) than male caries (1.4%), a difference which is statistically significant. Female teeth have statistically greater total caries frequencies than male teeth in the Late Group.

In male teeth from Non Nok Tha the frequency of caries increases only slightly in the Late Group (2.1% : 2.7%) [χ^2=0.220, df=1, p=0.639]. In contrast, in female teeth, there is a significant increase in caries frequency (1.3% : 5.7%) [χ^2=9.923, df=1, p=0.002], an increase which can be traced to an increase in caries of the maxillary and mandibular molars.

Table 5.68. Prevalence of Caries, By Sex and Group, in Adult and Adolescent (>15 years) Permanent Teeth from Non Nok Tha

(# of Individuals represented) Affected/Observed teeth Jaw/Tooth	Early Group (EP1-3, MP1-3)						Late Group (MP4-8)					
	Male (16)		Female (21)		Statistic		Male (20)		Female (19)		Statistic	
	A/O	%	A/O	%	Test	p	A/O	%	A/O	%	Test	p
Maxilla M3	0/12	0.0	0/15	0.0			1/11	9.1	1/9	11.1	FET	1.000
M2	0/19	0.0	2/30	6.7	FET	0.515	2/22	9.1	2/15	13.3	FET	1.000
M1	0/21	0.0	0/33	0.0			2/23	8.7	0/19	0.0	FET	0.492
P4	0/20	0.0	0/31	0.0			0/24	0.0	1/19	5.3	FET	0.442
P3	0/21	0.0	0/28	0.0			0/24	0.0	0/16	0.0		
C	0/19	0.0	0/23	0.0			0/17	0.0	0/11	0.0		
I2	0/10	0.0	0/16	0.0			0/15	0.0	0/12	0.0		
I1	0/10	0.0	0/14	0.0			1/14	7.1	1/12	8.3	FET	1.000
Total Maxillary Caries	0/132	0.0	2/190	1.1	FET	0.515	6/150	4.0	5/113	4.4	FET	1.000
Mandible M3	0/22	0.0	1/23	4.3	FET	1.000	0/15	0.0	4/17	23.5	FET	0.104
M2	2/23	8.7	1/32	3.1	FET	0.565	1/22	45	2/16	12.5	FET	0.562
M1	1/24	4.2	1/31	3.2	FET	1.000	0/16	0.0	1/20	5.0	FET	1.000
P4	1/23	4.3	0/29	0.0	FET	0.442	0/17	0.0	1/17	5.9	FET	1.000
P3	1/21	4.8	0/24	0.0	FET	0.467	1/21	4.8	1/17	5.9	FET	1.000
C	1/22	4.5	0/25	0.0	FET	0.468	0/22	0.0	0/17	0.0		
I2	0/10	0.0	0/16	0.0			0/19	0.0	0/14	0.0		
I1	0/7	0.0	0/12	0.0			0/13	0.0	0/13	0.0		
Total Mandibular Caries	6/152	3.9	3/192	1.6	FET	0.191	**2/145**	**1.4**	**9/131**	**6.9**	**χ^2=5.423**	**0.02**
Total Caries	6/284	2.1	5/382	1.3	FET	0.542	**8/292**	**2.7**	**14/244**	**5.7**	**χ^2=3.123**	**0.077**

Note: M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10).

In the presence of two instances of statistically significant sex differences, lumping the sexes for an examination of caries frequencies over time is appropriate. Table 5.69, documents a statistically significant increase in caries over time in the maxilla (0.6% : 4.2%), molars (2.8% : 7.8%), and in all teeth combined (1.7% : 4.1%). These differences are likely the result of the increase in maxillary molar caries in the Late Group which can be seen in Table 5.68. Although caries of the anterior teeth also increase in the Late Group, they remain unusual.

Table 5.69. Summary of Caries Prevalence by Group in Non Nok Tha Permanent Teeth (>15 years)

(# individuals) Teeth	Early Group (37)		Late Group (39)		Statistic	
	A/O	%	A/O	%	Test	p
Maxilla	**2/322**	**0.6**	**11/263**	**4.2**	**χ^2=8.450**	**0.004**
Mandible	9/344	2.6	11/276	4.0	χ^2=0.920	0.338
All Molars	**8/285**	**2.8**	**16/205**	**7.8**	**χ^2=6.394**	**0.011**
All Premolars	2/197	1.0	4/155	2.6	FET	0.411
All Canines	1/89	1.1	0/67	0.0	FET	1.000
All Incisors	0/95	0.0	2/112	1.8	FET	0.501
All Teeth	**11/666**	**1.7**	**22/539**	**4.1**	**χ^2=6.604**	**0.010**

Note: Early Group includes EP1-3, MP1-3; Late Group includes MP 4-8. A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probability). Includes 76 individuals: 36 males, 40 females. **Bold** indicates statistical significance (α=0.10).

A significant increase in caries in the Late group, suggests there may be changes in caries origin patterns over time (Table 5.70). In both jaws, caries are more common and more variable in the Late Group than in the Early Group. In the mandibular molars, there appears to be a transition from occlusal surface caries to other sites; which is also reflected in

Table 5.70. Non Nok Tha Adult Permanent Tooth Caries By Type, Jaw, Group and Tooth Class

Tooth Class/ Caries Type		Maxilla				Mandible			
		Early Group		Late Group		Early Group		Late Group	
		n/A	%	n/A	%	n/A	%	n/A	%
Molar	Occlusal	1/2	50.0	1/8	12.5	4/6	66.7	1/8	12.5
	Interproximal			3/8	37.5	0/6	0.0	2/8	25.0
	Crown			1/8	12.5	1/6	16.7	2/8	25.0
	Huge	1/2	50.0	3/8	37.5	1/6	16.7	3/8	37.5
Premolar	Interproximal			1/1	100.0	2/2	100.0	3/3	100.0
Canine	Interproximal					1/1	100.0		
Incisor	Occlusal			1/2	50.0				
	Interproximal			1/2	50.0				
Total	Occlusal	1/2	50.0	2/11	18.2	4/9	44.4	1/11	9.1
	Interproximal			5/11	45.5	3/9	33.3	5/11	45.5
	Crown			1/11	9.1	1/9	11.1	2/11	18.2
	Huge	1/2	50.0	3/11	27.3	1/9	11.1	3/11	27.3

Note: n=number, A=affected. 76 individuals are represented: 37 Early Group, 39 Late Group; 36 males, 40 females.

Table 5.71. Statistical Analyses of Caries Types in Molars and By Jaw and Group

Tooth Class/ Caries Type	Maxilla					Mandible				
	Early Group		Late Group		Test	Early Group		Late Group		Test
	n/A	%	n/A	%		n/A	%	n/A	%	
Molars					FET $P=$ 0.333					FET $P=$ 0.206
occlusal	1/1	100.0	1/5	20.0		4/5	80.0	1/5	20.0	
non-occlusal	0/1	0.0	4/5	80.0		1/5	20.0	4/5	80.0	
Total					FET $P=$ 0.333					FET $P=$ 0.282
occlusal	1/1	100.0	2/8	25.0		4/8	50.0	1/8	12.5	
non-occlusal	0/1	0.0	6/8	75.0		4/8	50.0	7/8	87.5	

Note: Early Group includes EP1-3, MP1-3; Late Group includes MP4-8. Huge caries are omitted from the statistical analysis. n=number, A=affected, FET=Fisher's Exact Test (2-tailed probabilities).

the total tooth summary. To assess the significance of these changes in the maxillary molars, mandibular molars, and all maxillary and mandibular teeth, the caries origins must be collapsed into occlusal/non-occlusal, and huge caries omitted (Table 5.71). None of the differences is statistically significant.

The final analysis of temporal change in Non Nok Tha caries is an analysis by age (Table 5.72). The Late Group sample is not well distributed over the age intervals, making the results less than promising. In the Early Group, slightly more than half of all caries (5/9, 55.5%) are recorded in individuals less than 40 years of age, while in the Late Group 35.0% (7/20) of the caries occur in younger individuals.

Table 5.72. Summary of Caries Prevalence By Group and Age in Non Nok Tha Permanent Teeth

Age Category	Early Group (EP, MP1-3)			Late Group (MP4-8)			Statistic
	A/O	%	# Indiv.	A/O	%	# Indiv.	
Young	5/296	1.7	13	1/122	0.8	8	FET 0.676
Middle	**1/245**	**0.4**	**14**	**18/327**	**5.5**	**20**	**χ^2=11.328 *p*=0.001**
Old	3/95	3.2	6	1/46	2.2	6	FET 1.000
Total	9/636	1.4	33	20/495	4.0	34	

Note: A=affected, O=observed. Sixty-five individuals with specific (5 year interval) age estimates are included here: 34 males, 36 females. **Bold** indicates statistical significance (α=0.10).

Summary of Caries Prevalence

Dental caries are uncommon in Non Nok Tha adults, occurring in 2.8% (34/1233) of the teeth. Caries are slightly more common in female teeth (3.1%) than male teeth (2.3%), a difference which is not statistically significant. The first age-at-occurrence of caries is 15-20 years, although 40% of all caries observed are in the 40-44.9 year age interval. In the younger age intervals, caries of the occlusal surface and the other crown surfaces are more common than the interproximal surfaces. Caries frequency increases over time (1.7% : 4.1%), an increase attributable to significant increases in the maxillary teeth (0.6% : 4.2%), all molars (2.8% : 7.8%), and in all teeth (1.7% : 4.1%). The only significant sex difference is in the Late Group mandibular teeth, where female caries (6.9%, 9/131) are nearly three times as common as male caries (1.4%, 2/145). There is no change in the male caries frequency over time (2.1% : 2.7%), however, in female teeth, there is a significant increase in caries in the Late Group (1.3% : 5.7%), and a significant increase in caries overall (1.7% : 4.1%). Although there is a shift from occlusal surface caries in the Early Group to non-occlusal surface caries in the Late Group, the change is not statistically significant.

Adult Abscessing

There are no abscesses in permanent tooth sockets in individuals less than 15 years of age at Non Nok Tha (Table 5.73).

Table 5.73. Abscessing in Nok Tha Subadult (<15 Years) Permanent Tooth Sockets

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/2			0/1	0/3	0/5			0/2	0/7	0/10
Female	0/5	0/2	0/1	0/4	0/12	0/9	0/4	0/3	0/9	0/25	0/37
? Sex						0/2			0/1	0/3	0/3
Total	0/7	0/2	0/1	0/5	0/15	0/16	0/4	0/3	0/12	0/35	0/50

Note: 9 individual burials (4 males, 4 females, 1 ?sex) are represented. M=molar, P=premolar, C=canine, I=incisor.

Table 5.74. Prevalence of Abscessing, By Sex, in Adult and Adolescent (>15 years) Permanent Teeth

Jaw/Tooth	Male		Female		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla M3	2/31	6.5	1/28	3.6	FET	1.000
M2	0/43	0.0	0/41	0.0		
M1	2/46	4.3	0/47	0.0	FET	0.242
P4	0/49	0.0	0/52	0.0		
P3	1/50	2.0	1/49	2.0	FET	1.000
C	0/49	0.0	0/43	0.0		
I2	0/40	0.0	0/36	0.0		
I1	0/36	0.0	0/33	0.0		
Total Maxillary Abscesses	5/344	1.5	2/329	0.6	FET	0.451
Mandible M3	1/43	2.3	0/42	0.0	FET	1.000
M2	2/47	4.3	2/48	4.2	FET	1.000
M1	5/47	10.6	1/49	2.0	FET	0.108
P4	2/50	4.0	1/49	2.0	FET	1.000
P3	3/54	5.6	0/46	0.0	FET	0.247
C	0/51	0.0	1/48	2.1	FET	0.485
I2	1/44	2.3	1/38	2.6	FET	1.000
I1	0/41	0.0	0/28	0.0		
Total Mandibular Abscesses	14/377	3.7	6/348	1.7	χ^2=2.670	0.102
Total Abscesses	**19/721**	**2.6**	**8/677**	**1.2**	**χ^2=3.895**	**0.048**

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test, 2-tailed probabilities. Includes 77 individuals: 37 males, 40 females; 75 adults (>20 years), 2 adolescents (15-20 years). **Bold** indicates statistical significance (α=0.10).

The prevalence of abscessing in 78 adults from Non Nok Tha is summarized, by sex, in Table 5.74. Abscessing is rare in the Non Nok Tha permanent tooth sockets (1.9%, 27/1398), occurring nearly twice as often in male sockets (2.6%, 19/721) than female sockets (1.2%, 8/677). Abscessing is more common in the mandible than the maxilla, with the molars and premolars more commonly affected than the anterior teeth. Other than the tooth socket totals, there are no other significant sex differences in abscessing prevalence.

Examining the occurrence of dental abscessing by age intervals (Table 5.75), it is evident that abscessing is a disease of late adulthood. Abscessing prevalence is highest in the decade spanning 35-45 years with nearly 70% of all abscesses recorded in these intervals. There are virtually no abscesses in individuals less than 35 years of age (0.6%, 3/484), and slightly more in those over 45 years of age (2.0%, 5/243).

Table 5.75. Summary of Abscessing, By Age, in Non Nok Tha Permanent Tooth Sockets (Individuals >15 years of age)

A/O	Age Interval in Years (Number of Individuals)									Total (68)	
MAXILLA	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (14)	40-45 (13)	45-50 (6)	50-55 (4)	55-60 (9)		
M3	0/5	0/5	0/10	1/5	0/13	1/12	0/1	0/2	1/3	3/56	5.4
M2	0/7	0/7	0/13	0/7	0/20	0/17	0/3	0/1	0/6	0/81	0.0
M1	0/7	0/7	0/12	0/7	2/22	0/20	0/4	0/4	0/6	2/89	2.2
Premolars	0/14	0/14	0/26	0/17	1/43	1/44	0/12	0/10	0/14	2/194	1.0
Canine	0/6	0/7	0/13	0/8	0/20	0/19	0/6	0/5	0/6	0/90	0.0
Incisors	0/9	0/12	0/22	0/14	0/36	0/24	0/9	0/9	0/6	0/141	0.0
Total	0/48 0.0%	0/52 0.0%	0/96 0.0%	1/58 1.7%	3/154 1.9%	2/136 1.5%	0/35 0.0%	0/31 0.0%	1/41 2.4%	7/651	1.1
MANDIBLE											
M3	0/5	0/7	0/9	1/6	0/20	0/17	0/3	0/3	0/7	1/77	1.3
M2	0/6	0/8	0/10	0/7	2/22	1/22	0/3	0/5	1/7	4/90	4.4
M1	0/6	0/11	0/10	0/7	1/19	3/20	0/3	1/5	0/6	5/87	5.7
Premolars	0/10	0/19	1/17	0/12	3/38	1/42	0/10	0/12	1/21	6/181	3.3
Canine	0/6	0/9	0/6	0/7	0/20	1/21	0/5	0/5	0/11	1/90	1.1
Incisors	0/12	0/16	0/15	0/9	0/33	1/28	1/11	0/6	0/13	2/143	1.4
Total	0/45 0.0%	0/70 0.0%	1/67 1.5%	1/48 2.1%	6/152 3.9%	7/150 4.7%	1/35 2.9%	1/36 2.8%	2/65 3.1%	19/668	2.8
TOTAL	0/93 0.0%	0/122 0.0%	1/163 0.6%	2/106 1.9%	9/306 2.9%	9/286 3.1%	1/70 1.4%	1/67 1.5%	3/106 2.8%	26/1319	2.0

Note: A=affected, O=observed, M=molar. Only individuals with specific (5 year interval) age estimates are included here: 33 males, 35 females.

A brief look at abscessing in all tooth sockets, by age and sex (Table 5.76) documents an absence of any overt sex differences. Females are under-represented in the older age intervals, the majority of abscesses occur in the male tooth sockets. In both sexes abscesses are rare in early adulthood.

Table 5.76. Abscess Prevalence by Age and Sex in Non Nok Tha Permanent Tooth Sockets

Sex	Age Interval in Years								
(# individuals)	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
Male	(1)	(2)	(2)	(3)	(9)	(4)	(5)	(1)	(6)
A/O	0/29	0/48	0/57	2/67	9/214	3/111	1/60	1/9	2/86
%	0.0	0.0	0.0	3.0	4.2	2.7	1.7	11.1	2.3
Female	(3)	(4)	(5)	(2)	(5)	(9)	(1)	(1)	(1)
A/O	0/64	0/74	1/106	0/39	0/92	6/175	0/10	0/58	1/20
%	0.0	0.0	0.9	0.0	0.0	3.4	0.0	0.0	5.0

Note: A=affected, O=observed. Includes 68 burials with specific (5 year interval) age estimates: 33 males, 35 females.

Temporal Trends in Non Nok Tha Abscessing

Table 5.77 summarizes the frequencies of abscessing, by tooth, in the males and females in the Non Nok Tha Early and Late Groups. Statistical testing of sex differences within the groups is also shown. In the Early Group, abscessing is significantly more common in male sockets (2.4%, 8/334) than female sockets (0.7%, 3/433). There are no abscesses noted in the Early Group female maxillary tooth sockets (0/220). Overall, abscessing is rare in the Early Group (1.4%, 11/767) and is noted only in the molars of both jaws and the fourth premolar of the mandible.

In the Late Group, abscessing is also more common in male tooth sockets (3.0%, 11/363) than female tooth sockets (2.1%, 5/236), but none of the sex differences is statistically significant. The higher abscessing rate in the Late Group (2.7%, 16/599) appears to relate

Table 5.77. Prevalence of Abscesses, By Sex and Group in Adult and Adolescent (>15 years) Permanent Tooth Sockets from Non Nok Tha

(# of Individuals) Affected/Observed teeth Jaw/Tooth	Early Group (EP 1-3, MP 1-3)						Late Group (MP 4-8)					
	Male (15)		Female (21)		Statistic		Male (20)		Female (18)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla M3	2/16	12.5	0/17	0.0	FET	0.227	0/14	0.0	1/10	10.0	FET	0.417
M2	0/22	0.0	0/25	0.0			0/20	0.0	0/15	0.0		
M1	1/22	4.5	0/30	0.0	FET	0.423	1/23	4.3	0/16	0.0	FET	1.000
P4	0/21	0.0	0/35	0.0			0/27	0.0	0/16	0.0		
P3	0/21	0.0	0/33	0.0			1/28	3.6	1/15	6.7	FET	1.000
C	0/21	0.0	0/32	0.0			0/27	0.0	0/10	0.0		
I2	0/18	0.0	0/25	0.0			0/21	0.0	0/10	0.0		
I1	0/15	0.0	0/23	0.0			0/20	0.0	0/10	0.0		
Total Maxillary Abscesses	**3/156**	**1.9**	**0/220**	**0.0**	**FET**	**0.071**	2/180	1.1	2/102	2.0	FET	0.622
Mandible M3	1/23	4.3	0/25	0.0	FET	0.479	0/18	0.0	0/16	0.0		
M2	0/22	0.0	1/32	3.1	FET	1.000	2/23	8.7	1/16	6.3	FET	1.000
M1	3/24	12.5	1/33	3.0	FET	0.300	2/21	9.5	0/16	0.0	FET	0.495
P4	0/25	0.0	1/30	3.3	FET	1.000	2/23	8.7	0/19	0.0	FET	0.492
P3	1/25	4.0	0/26	0.0	FET	0.490	2/27	7.4	0/20	0.0	FET	0.500
C	0/24	0.0	0/27	0.0			0/25	0.0	1/21	4.8	FET	0.457
I2	0/18	0.0	0/24	0.0			1/24	4.2	1/14	7.1	FET	1.000
I1	0/17	0.0	0/16	0.0			0/22	0.0	0/12	0.0		
Total Mandibular Abscesses	5/178	2.8	3/213	1.4	FET	0.477	9/183	4.9	3/134	2.2	χ^2=1.525	0.217
Total Abscesses	**8/334**	**2.4**	**3/433**	**0.7**	**FET**	**0.066**	11/363	3.0	5/236	2.1	χ^2=0.457	0.499

Note: M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test (two-tailed probabilities). **Bold indicates statistical significance** (α=0.10).

to a general increase in abscessing in male and female molars and the appearance of abscessing of the anterior mandibular teeth.

There is an increase in abscessing in both the Late Group male (2.4% : 3.0%) and female (0.7% : 2.1%) tooth sockets. Although none of the group differences shown in Table 5.78 is statistically significant, it is evident that the increase in male abscessing occurs in the mandible and the increase in female abscessing occurs in both jaws. This change may be related to a change in the demographic profile of the population, changes in the attrition and/or changes in the functional use of the teeth over time.

Table 5.78. Abscessing Prevalence by Group in Non Nok Tha Permanent Tooth Sockets (>15 years)

Tooth Sockets		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	p
Male	Maxilla	3/156	1.9	2/180	1.1	FET	0.666
	Mandible	5/178	2.8	9/183	4.9	χ^2=1.077	0.299
	All Sockets	8/334	2.4	11/363	3.0	χ^2=0.265	0.607
Female	Maxilla	0/220	0.0	2/102	2.0	FET	0.100
	Mandible	3/213	1.4	3/134	2.2	FET	0.680
	All Sockets	3/433	0.7	5/236	2.1	FET	0.138
All Sockets		11/767	1.4	16/602	2.7	χ^2=2.612	0.106

Note: Early Group includes EP 1-3, MP 1-3; Late Group includes MP 4-8. A=affected, O=observed, M=male, F=female, FET=Fisher's Exact Test (2-tailed probability). Includes 74 individuals: 35 males, 39 females, 1 ?sex. **Bold** indicates statistical significance (α=0.10).

Summary of Non Nok Tha Abscessing

Abscessing is rare in the Non Nok Tha adult dental sample (1.9%, 27/1398). Abscessing is twice as frequent in male tooth sockets (2.6%, 19/721) as female tooth sockets

(1.2%, 8/677) and is rare in maxillary teeth (1.0%, 7/673). Abscessing is uncommon in individuals less than 35 years of age (0.6%). There are no apparent sex differences in the age distribution of abscessing.

Dental abscessing is more common in males than females in both groups of the Non Nok Tha habitation. There are no statistically significant sex differences within the groups. In the Late Group, abscessing increases in both males (2.4% : 3.0%), females (0.7% : 2.1%), and overall (1.4% : 2.7%), but the differences are not statistically significant.

Periodontal Disease

Adult Alveolar Resorption

Alveolar resorption, scored on a four point scale, is summarized in adult permanent tooth sockets in Table B.31. No alveolar resorption was found in subadult permanent tooth sockets (Table 5.79).

Table 5.79. Alveolar Resorption in Non Nok Tha Subadult (<15 Years) Permanent Teeth

Sex	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/2			0/1	0/3	0/2			0/2	0/4	0/7
Female	0/4	0/2		0/1	0/7	0/5	0/2	0/1	0/2	0/10	0/17
? Sex						0/2			0/1	0/3	0/3
Total	0/6	0/2		0/2	0/10	0/9	0/2	0/1	0/5	0/17	0/27

Note: M=molar, P=premolar, C=canine, I=incisor. Seven individual burials (2 males, 4 females, 1 ?sex) are represented.

In the adult permanent tooth sockets, resorption is more common in the maxilla (44.7%, 209/468) than the mandible (33.4%, 185/554). Within the tooth classes, resorption is more common in the premolar sockets (47.0%) than the molars (37.1%), but then declines in frequency in the anterior teeth. Summing all of the tooth sockets, slight alveolar resorption is noted in 29.5% [Figure 5.21], moderate in 6.9%, and marked in 2.2% of the permanent tooth sockets observed. Resorption of all degrees is much more common in male tooth sockets (45.9%) than female tooth sockets (29.4%), and there are more advanced observations (moderate and marked) in male sockets (12.6% : 4.6%). Statistical testing of these frequencies (Table 5.80) demonstrates statistically significant differences in advanced resorption in the maxilla and in the summed tooth sockets.

Table 5.80. Sex Differences in Alveolar Resorption Prevalence in Adult Permanent Tooth Sockets

Jaw/Degree of resorption Affected Sockets		Male		Female		Statistic	
		A	%	A	%	Test	Probability
Maxilla	Absent/slight	211	82.4	205	96.7	**χ^2=23.931**	**0.000**
	Advanced	45	17.6	7	3.3		
Mandible	Absent/slight	283	91.3	230	94.3	χ^2=1.760	0.185
	Advanced	27	8.7	14	5.7		
Total	Absent/slight	494	87.3	435	95.4	**χ^2=20.108**	**0.000**
	Advanced	72	12.7	21	4.6		

Note: A=affected. Includes 74 individuals: 37 males, 37 females; 72 adults, 2 adolescents. **Bold** indicates statistical significance (α=0.10).

The demographic profile of this sample is skewed toward young adult females (6 males, 13 females), but the number of middle age and old persons is approximately even. To mitigate the influence of a skewed age distribution, evaluation of the distribution of resorption by age is necessary (Table 5.81). As expected, the advanced degrees of alveolar resorption are noted in the older aged individuals in the Non Nok Tha skeletal sample.

Table 5.81. Summary of Alveolar Resorption by Age in Non Nok Tha Permanent Tooth Sockets (Individuals >15 years of age)

Jaw/ Degree	Age Interval in Years (Number of Individuals)									Total (49)	
Observed % Affected	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (14)	40-45 (11)	45-50 (6)	50-55 (4)	55-60 (9)		
Maxilla	51	38	65	27	121	87	17	17	32	455	
Absent	100.0	100.0	80.0	59.3	33.1	55.2	47.1	23.5	6.3	259	56.9%
Slight			20.0	40.7	55.4	36.8	47.1	47.1	21.9	146	32.1%
Moderate					11.6	8.0	5.9	29.4	62.5	47	10.3%
Marked									9.4	3	0.7%
Mandible	31	61	57	34	131	101	15	26	57	516	
Absent	79.4	90.2	86.0	82.4	61.8	76.2	66.7	26.9	29.8	351	68.0%
Slight	20.6	6.6	14.0	17.6	29.0	22.8	33.3	57.7	31.6	124	24.0%
Moderate		3.3			6.1	0.0		11.5	15.8	22	4.3%
Marked					3.1	1.0		3.8	22.8	19	3.7%

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 33 males, 33 females.

In the maxillary tooth sockets, slight resorption is noted at 25 years, while advanced (moderate and marked) alveolar resorption is not seen until age 35-40 years. In the mandible, slight degrees of resorption are found in the young adult age intervals, and advanced absorption mirrors the maxilla, occurring at 35-40 years.

Because there are significant sex differences, the distribution of alveolar resorption by age, in each sex should be compared. In order to facilitate statistical testing of these frequencies the age categories are collapsed into young adult (15-35), middle-age (35-50) and old age (50-60) [Table 5.82]. Male tooth sockets have significantly more alveolar resorption than females in the middle and old age categories.

Table 5.82. Statistical Analyses of Alveolar Resorption in Permanent Tooth Sockets By Sex and Age

Age Category Degree of Resorption		Male		Female		Statistic	
		A/O	%	A/O	%	Test	p
Young Adult	Absent/slight	154/154	100.0	211/213	99.1	FET	0.512
	Advanced	0/154	0.0	2/213	0.9		
Middle-Aged	Absent/slight	272/304	89.5	165/168	98.2	**χ^2=12.04**	**0.001**
	Advanced	32/304	10.5	3/168	1.8		
Old-aged	Absent/slight	41/79	51.9	37/53	69.8	**χ^2=4.210**	**0.040**
	Advanced	38/79	48.1	16/53	30.2		

Note: A=affected, O=observed, FET=Fisher's Exact Test, two-tailed probability. There are 22 young adults (15-35 years), 31 middle-aged (35-50 years), and 13 old aged individuals (50+ years). **Bold** indicates statistical significance (α=0.10).

Table 5.83. Summary of Alveolar Resorption by Age in Non Nok Tha Adult Permanent Tooth Sockets (Jaws Combined)

Degree Observed Sockets Affected %	Age Interval in Years (Number of Individuals)									Total (49)	
	15-20 (4)	20-25 (6)	25-30 (7)	30-35 (5)	35-40 (14)	40-45 (11)	45-50 (6)	50-55 (4)	55-60 (9)		
Early Group	62	82	35	56	90	105	5	36	42	513	
Absent	96.8	93.9	94.3	69.6	56.7	76.2	100.0	19.4	16.7	359	70.0%
Slight	3.2	3.7	5.7	30.4	42.2	23.8		58.3	21.4	117	22.8%
Advanced		2.4			1.1			22.2	61.9	37	7.2%
Late Group	23	1	87	5	162	83	27	0	47	435	
Absent	78.3	0.0	78.2	100.0	43.2	54.2	48.1		25.5	231	53.1%
Slight	21.7	100.0	21.8		41.4	36.1	48.1		34.0	151	34.7%
Advanced					15.4	9.6	3.7		40.4	53	12.2%

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 33 males, 33 females.

Table 5.84. Prevalence of Alveolar Resorption By Group in Adult (>15 years) Permanent Tooth Sockets from Non Nok Tha

(# of Individuals) Jaw/Degree A/O Sockets		Early Group (EP 1-3, MP 1-3)						Late Group (MP 4-8)					
		Male (15)		Female (19)		Statistic		Male (20)		Female (17)		Statistic	
		A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla	Absent/slight	85/104	81.7	140/144	97.2	**χ^2=17.22**	**0.000**	121/147	82.3	59/61	96.7	**χ^2=7.683**	**0.006**
	Advanced	19/104	18.3	4/144	2.8			26/147	17.7	2/61	3.3		
Mandible	Absent/slight	122/135	90.4	154/157	98.1	**χ^2=8.350**	**0.004**	145/159	91.2	76/87	87.4	χ^2=0.908	0.341
	Advanced	13/135	9.6	3/157	1.9			14/159	8.8	11/87	12.6		
Total	Absent/slight	207/239	86.6	294/301	97.7	**χ^2=24.34**	**0.000**	266/306	86.9	135/148	91.2	χ^2=1.779	0.182
	Advanced	32/239	13.4	7/301	2.3			40/306	13.1	13/148	8.8		

Note: A=affected, O=observed. There are 77 individuals represented here: 34 Early Group, 37 Late Group. **Bold indicates statistical significance** (α=0.10).

Alveolar Resorption By Group

The next pertinent question is whether or not the prevalence or distribution of alveolar resorption changes over time. The distribution of alveolar resorption by age and group (Table 5.83) illustrates a younger age-at-occurrence of advanced degrees of resorption in the Early Group. But, there are fewer advanced observations in all (7.2%) compared to the Late Group (12.2%).

Examining each group sample for sex differences which were noted in the whole sample (Table 5.84), there are significant differences in the maxilla, mandible and summed tooth sockets in the Early Group, with male tooth sockets having more severe alveolar resorption than females. In the Late Group, the sex differences are less obvious, and the total frequencies are not statistically different. The prevalence of advanced resorption is nearly identical in Early and Late Group males (χ^2=0.012, df=1, p=0.914). In female tooth sockets, the Late Group has more advanced observations (2.3% : 8.8%), a difference which is statistically significant (χ^2=9.723, df=1, p=0.002).

Examining the group sub-samples, controlling for age, there is a significant increase in advanced alveolar resorption in the Late Group middle-aged sample, as well as the Late Group total sample (Table 5.85).

Table 5.85. Prevalence of Alveolar Resorption, By Group, in Adult (>15 years) Permanent Teeth

Jaw Degree of Resorption		Early Group		Late Group		Statistic	
		A	%	A	%	Test	Probability
Young Adult	Absent/slight	233	99.1	116	100.0	FET	1.000
	Advanced	2	0.9	0	0.0		
Middle-age	Absent/slight	199	99.5	238	87.5	**χ^2=24.17**	**0.000**
	Advanced	1	0.5	34	12.5		
Old	Absent/slight	44	56.4	28	59.6	χ^2=0.120	0.729
	Advanced	34	43.6	19	40.4		
Total	Absent/slight	501	92.8	401	88.3	**χ^2=5.820**	**0.016**
	Advanced	39	7.2	53	11.7		

Note: A=affected. Includes 64 individuals with estimated age intervals: 30 Early Group, 34 Late Group. **Bold** indicates statistical significance (α=0.10).

Summary of Alveolar Resorption

Alveolar resorption of all degrees is found in 38.6% (394/1022) of the adult tooth sockets at Non Nok Tha. Slight resorption is noted in 29.5%, moderate in 6.9%, and marked resorption is found in 2.2% of the tooth sockets. Advanced resorption (moderate or marked levels) is more common in male tooth sockets (12.6%) than female sockets (4.6%), even when age is controlled. Slight alveolar resorption is noted by age 25 years in this series, while advanced observations are not seen until age 35-40 years. Advanced alveolar resorption increases in the Late Group at Non Nok Tha (7.2% : 12.2%). Although the frequency of advanced resorption in male sockets remains the same (13.4% : 13.1%), there is an increase in affected female tooth sockets (2.3% : 8.8%).

Dental Calculus

Calculus, scored on a four point scale (none, slight, moderate, marked) in all available teeth, is relatively common (83.9%) in the Non Nok Tha permanent dental remains (Table B.32). Marked calculus is noted in 1.2% (11/945) of all adult teeth, moderate calculus in 29.3% (277/945) and slight calculus in 53.4% (505/945). Advanced calculus (moderate and

Table 5.86. Slight Calculus Formation in Non Nok Tha Subadult (<15 Years) Permanent Teeth

Sex A/O	Maxilla					Mandible					Total
	M	P	C	I	Total	M	P	C	I	Total	
Male	0/3			0/1	0/4	0/2			0/2	0/4	0/8
Female	2/4	2/2	1/1	2/2	7/11	0/4			0/2	0/6	7/10
? Sex						0/2			0/1	0/3	0/3
Total	2/7	2/2	1/1	2/5	7/15	0/8			0/5	0/13	7/28

Note: M=molar, P=premolar, C=canine, I=incisor, A=affected, O=observed. Seven individual burials (2 males, 4 females, 1?sex) are represented.

marked degrees) is more common in the mandible (40.0%) than in the maxilla (23.1%), and is noted in declining frequency from the molars (32.7%), premolars (29.5%), canines (29.0%), and incisors (27.8%). Slight calculus formation is noted in 25.0% of the permanent teeth in the subadult (<15 years) population at Non Nok Tha (Table 5.86). All observations are recorded in a single individual aged 12-14 years.

The sex ratio (male : female) of the adult permanent tooth sample (N=66 burials) available for examination of calculus is skewed toward young adult females (5 : 12) and middle-aged males (22 : 14), suggesting that there should be a significant sex difference in the prevalence of advanced calculus. The prevalence and degree of calculus are greater in male teeth in both the maxilla and mandible, and overall (Table 5.87).

Table 5.87. Prevalence of Calculus, By Sex, in Adult Permanent Teeth from Non Nok Tha

Jaw Degree of calculus		Male		Female		Statistic	
		A	%	A	%	Test	Probability
Maxilla	Absent/slight	158/239	66.1	188/211	89.1	**χ^2=33.334**	**0.000**
	Advanced	81/239	33.9	23/211	10.9		
Mandible	Absent/slight	145/287	50.5	166/208	79.8	**χ^2=44.286**	**0.000**
	Advanced	142/287	49.5	42/208	20.2		
Total Sockets	Absent/slight	223/526	57.6	354/419	84.5	**χ^2=79.544**	**0.000**
	Advanced	223/526	42.4	65/419	15.5		

Note: A=affected. Includes 66 individuals: 35 males, 31 females; 64 adults (>20 years), 2 adolescents. **Bold** indicates statistical significance (α=0.10).

The skewed age distribution between males and females in the Non Nok Tha sample is evident in Table 5.88, examining the prevalence of calculus by five year age interval (N=58). Moderate calculus is observed at an earlier age in the female teeth (15-20 years) than in the male teeth (20-25 years), but slight calculus is present on most of the male teeth by young adulthood (Figure 5.21). Within each age interval, male teeth tend to have a greater degree of calculus than female teeth. As expected, marked calculus is not noted until the 40-45 year age interval.

Table 5.88. Summary of Calculus by Age in Non Nok Tha Permanent Teeth (Individuals >15 years of age)

Degree	Age Interval in Years (Number of Individuals)									Total (58)	
Observed A/O %	15-20 (4)	20-25 (6)	25-30 (6)	30-35 (4)	35-40 (13)	40-45 (12)	45-50 (5)	50-55 (2)	55-60 (6)		
Male	22	44	39	41	169	88	36	9	49	497	
Absent	9.1	2.3	12.8	63.4	0.0	13.6	11.1	0.0	4.1	52	10.5
Slight	90.9	79.5	25.6	14.6	66.3	39.8	19.4	0.0	16.3	233	46.9
Moderate		18.2	61.5	22.0	33.7	46.6	55.6	100.0	71.4	203	40.8
Marked							13.9		8.2	9	1.8
Female	58	57	79	34	53	82	0	6	7	376	
Absent	48.3	68.4	3.8	20.6	26.4	0.0		0.0	0.0	91	24.2
Slight	41.4	31.6	84.8	79.4	69.8	46.3		100.0	42.9	220	58.5
Moderate	10.3	0.0	11.4	0.0	3.8	51.2		0.0	57.1	63	16.8
Marked						2.4				2	0.5
Total	80	101	118	75	222	170	36	15	56	873	
Absent	37.5	39.6	6.8	44.0	6.3	7.1	11.1	0.0	3.6	143	16.4
Slight	55.0	52.5	65.3	44.0	67.1	42.9	19.4	40.0	19.6	453	51.9
Moderate	7.5	7.9	28.0	12.0	26.6	48.8	55.6	60.0	69.6	266	30.5
Marked						1.2	13.9	0.0	7.1	11	1.3

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 31 males, 27 females.

By collapsing the age intervals, sex differences in calculus prevalence can be statistically tested (Table 5.89). In the young adult category (15-35 years) male teeth have significantly more advanced calculus than the female teeth. In the middle age interval, male teeth have only slightly more advanced calculus than female teeth, while in the old-age interval, there is a much greater frequency of advanced calculus in the male teeth.

Table 5.89. Analysis of Calculus in Permanent Tooth Sockets at Non Nok Tha By Sex and Age

Age Group Degree of Resorption	Male		Female		Statistic	
	A/O	%	A/O	%	Test	p
Young Adult Absent/slight	105/146	71.9	213/228	93.4	**χ^2=32.33**	**0.000**
Advanced	41/146	28.1	15/228	6.6		
Middle-Aged Absent/slight	170/293	58.0	89/135	65.9	χ^2=2.417	0.120
Advanced	123/293	42.0	46/135	34.1		
Old-aged Absent/slight	48/58	17.2	9/13	69.2	**FET**	**0.0004**
Advanced	48/58	82.8	4/13	30.8		

Note: A=affected, O=observed. Twenty young adult (15-35 years), 30 middle-aged (35-50 years), and 8 old aged individuals (50+ years). **Bold** indicates statistical significance (α=0.10).

Temporal Change in Calculus Prevalence

Examining the prevalence of calculus by group in the Non Nok Tha dental sample, requires evaluation of the presence of sex differences within each sample (Table 5.90). The Early Group male teeth have significantly more advanced calculus than the female teeth, in the presence of fairly even tooth sample sizes. This is likely due to the presence of more older age males, although, as noted above, controlling for age, males have more advanced calculus than females. In the Late Group the dental sample has a more even age distribution, male teeth also have significantly more advanced calculus than female teeth.

Table 5.90. Prevalence of Calculus By Group and Sex in Adult (>15 years) Permanent Teeth from Non Nok Tha

(# of Individuals) Jaw	Per Tooth	Early Group (EP, MP 1-3) Male (16) A/O	%	Female (17) A/O	%	Statistic Test	p	Late Group (MP 4-8) Male (17) A/O	%	Female (13) A/O	%	Statistic Test	p
Maxilla	Absent/slight	65/105	61.9	117/124	94.4	**χ^2=36.7**	**0.000**	89/130	68.5	65/81	80.2	**χ^2=3.52**	**0.061**
	Advanced	40/105	38.1	7/124	5.6			41/130	31.5	16/81	19.8		
Mandible	Absent/slight	66/143	46.2	103/125	82.4	**χ^2=37.6**	**0.000**	71/132	53.8	63/83	75.9	**χ^2=10.6**	**0.001**
	Advanced	77/143	53.8	22/125	17.6			61/132	46.2	20/83	24.1		
Total	Absent/slight	131/248	52.8	220/249	88.4	**χ^2=75.6**	**0.000**	160/262	61.1	128/164	78.0	**χ^2=13.3**	**0.000**
	Advanced	117/248	47.2	29/249	11.6			102/262	38.9	36/164	22.0		

Note: A=affected, O=observed. 63 individuals are represented: Early Group 33, Late Group 30. **Bold** indicates statistical significance (α=0.10).

Figure 5.21. Slight Calculus and Alveolar Resorption in Maxillary Teeth

Figure 5.22. Advanced Attrition of the Anterior Mandibular Teeth

There is a statistically significant decline in advanced calculus in male teeth (47.2% : 38.9%) [χ^2=3.536, df=1, p=0.060]. There is a significant increase in advanced calculus in female teeth in the Late Group (11.6% : 22.0% [χ^2=7.917, df=1, p=0.005]).

Finally, combining the sexes and controlling for general age categories, the prevalence of calculus by group at Non Nok Tha is summarized in Table 5.91. Overall, there is a significant increase in the prevalence of advanced calculus in the Late Group. This trend is noted in the young adult age category, where there is nearly a seven-fold increase in advanced calculus in the Late Group (7.6% : 29.5%). However, in the middle-age category, there is a decline in advanced calculus (47.6% : 31.0%) in the Late Group, while the old aged sample is quite small, there is also a decline in advanced observations in this group (80.4% : 78.9%). Much of the overall increase in advanced calculus in the Late Group, can be attributed to an increase in advanced calculus in young adults.

Table 5.91. Prevalence of Calculus, By Group and Age, in Adult (>15 years) Permanent Teeth

Age Category Degree of calculus		Early Group		Late Group		Statistic	
		A	%	A	%	Test	Probability
Young	Absent/slight	231	92.4	79	70.5	**χ^2=30.059**	**0.000**
	Advanced	19	7.6	33	29.5		
Middle	Absent/slight	93	54.1	166	64.8	**χ^2=4.998**	**0.025**
	Advanced	79	45.9	90	31.0		
Old	Absent/slight	9	19.6	4	21.1	FET	1.000
	Advanced	37	80.4	15	78.9		
Total	Absent/slight	333	71.2	249	64.3	**χ^2=4.524**	**0.033**
	Advanced	135	28.8	138	35.7		

Note: A=affected, FET=Fisher's Exact Test (2-tailed probability). Includes only individuals with age interval estimates: 33 males, 30 females. Young is 15-35 years, Middle is 35-50 years, Old is 50-60+ years. **Bold** indicates statistical significance (α=0.10).

Summary of Dental Calculus

Calculus of all degrees is noted in 83.9% of the adult permanent teeth at Non Nok Tha, with advanced calculus (moderate and marked degrees) in 30.5% of teeth. Advanced dental calculus is more common in male teeth (42.4%) than female teeth (15.5%), a difference supported by the presence of moderate calculus by early adulthood in males. Marked calculus is not observed until age 45-50 years. Male teeth are more commonly and more severely affected by calculus than female teeth in both the Early and Late Groups at Non Nok Tha. Overall, there is an increase in advanced calculus in the Late Group at Non Nok Tha, primarily attributable to an increase in observations of advanced calculus in young adults. Male teeth exhibit less advanced calculus in the Late Group (47.2% : 38.9%), while female teeth have an increased frequency (11.6% : 22.0%).

Dental Attrition in Non Nok Tha Permanent Teeth

General observations of dental attrition (none, enamel, dentin, pulp, roots) were systematically scored in the permanent teeth from Non Nok Tha. Again, for consistency, the results are reported as adult (>15 years) and subadult (<15 years) permanent teeth. Although this is a subjective and very general system of scoring, for purposes of an overview of the population it is appropriate. Exposure of the dentin (13.5%) is noted in five mandibular teeth (Table 5.92) in the subadult permanent teeth at Non Nok Tha. These observations are from a single individual (Burial 2-116, a 12-15 year old) and include the mandibular incisors and right first molar. As would be expected, enamel wear is the most prevalent level of attrition in both the molars (80.0%) and premolars (100%), although the sample is quite small.

Table 5.92. Dental Attrition in Non Nok Tha Subadult (<15 years) Permanent Teeth

Tooth Class/Degree Affected/Observed		Maxilla				Mandible			
		Male	Female	?Sex	Total	Male	Female	?Sex	Total
Molars	None	0/3	2/5		2/8	0/5	0/8	2/2	2/15
	Enamel	3/3	3/5		6/8	5/5	7/8	0/2	12/15
	Dentin					0/5	1/8	0/2	1/15
Premolars	Enamel		2/2		2/2		4/4		4/4
Canines	None	1/1	0/1		1/2	1/1	0/3		1/4
	Enamel	0/1	1/1		1/2	0/1	3/3		3/4
Incisors	None	3/3	1/3		4/6	0/2	2/9	1/1	3/12
	Enamel	0/3	2/3		2/6	2/2	3/9	0/1	5/12
	Dentin					0/2	4/9	0/1	4/12
Total	None	4/7	3/11		7/18	1/8	2/24	3/3	6/35
	Enamel	3/7	8/11		11/18	7/8	17/24	0/3	24/35
	Dentin					0/8	5/24	0/3	5/35

Note: Nine individual burials represented: four males, four females, one ?sex. Five individuals are aged 6-8 years, three aged 8-11, and one aged 12-14 years.

Dental attrition in the Non Nok Tha adult permanent teeth is summarized in Table B.33. In this sample of 80 individuals, the majority of the teeth exhibit enamel wear (46.5%) or dentin exposure (45.3%). Advanced attrition (exposure of the pulp and loss of the entire crown), occurs in 6.3% (76/1199) of the teeth [Figure 5.22]. More advanced wear is noted in the mandibular teeth (7.3%, 45/612) than in the maxillary teeth (5.3%, 31/587); and by tooth class, in the canines (9.0%), incisors (8.2%) and premolars (8.0%).

Closer examination of possible sex differences in dental attrition (Table 5.93) shows the greater prevalence of advanced wear in the male maxillary teeth (6.6%) is not statistically greater than that in the female maxillary teeth (4.0%). In the mandible, male teeth have

significantly more advanced attrition in the premolars (12.8% : 3.7%) and mandibular molars (9.5% : 5.2%), and overall (8.1% : 4.6%).

Table 5.93. Prevalence of Advanced Dental Attrition, By Sex, in Adult (>15 years) Permanent Teeth

Jaw/Tooth Class Advanced attrition	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
Maxilla Molars	3/111	2.7	3/119	2.5	FET	1.000
Premolars	**10/91**	**11.0**	**4/94**	**4.3**	χ^2**=2.997**	**0.083**
Canines	4/36	11.1	2/35	5.7	FET	0.674
Incisors	2/49	4.1	3/52	5.8	FET	1.000
Total	19/287	6.6	12/300	4.0	χ^2=2.013	0.156
Mandible Molars	4/122	3.3	7/131	5.3	χ^2=0.648	0.421
Premolars	**11/86**	**12.8**	**3/81**	**3.7**	χ^2**=4.485**	**0.034**
Canines	6/45	13.3	2/40	5.0	FET	0.272
Incisors	8/51	15.7	4/56	7.1	χ^2=1.957	0.162
Total	**29/304**	**9.5**	**16/308**	**5.2**	χ^2**=4.239**	**0.039**
All Teeth	**48/591**	**8.1**	**28/608**	**4.6**	χ^2**=6.242**	**0.012**

Note: A=affected, O=observed. Includes 80 individuals: 39 males, 41 females; 78 adults (>20 years), 2 adolescents. **Bold** indicates statistical significance (α=0.10).

Table 5.94 documents dental attrition, by degree, in individuals with age estimates within 5-year intervals (n=69 burials, 1122 teeth). In male teeth, wear to the pulp (2.2%) and roots (2.2%) is first noted at 35-40 years, while in females advanced wear is not seen until the next interval, 40-45 years (6.3%). The larger sample sizes in the older age intervals in males may account for the greater prevalence of advanced wear in Non Nok Tha males.

There is no apparent difference in the onset of advanced wear between the maxilla and mandible. However, as noted before, advanced wear is more common in the mandibular teeth (6.9%) than the maxillary teeth (4.6%).

Table 5.94. Summary of Dental Attrition By Age, Jaw and Sex in Non Nok Tha Permanent Teeth (Individuals >15 years of age)

Sex/Jaw Teeth A/O		Age Interval in Years									Total
		15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Male	# Individuals	1	2	2	3	10	4	5	1	6	34
	None/enamel	16/23	26/44	37/38	28/48	86/185	49/100	10/41	1/14	16/68	269/561
	Dentin	7/23	18/44	1/38	20/48	91/185	41/100	23/41	9/14	41/68	251/561
	Pulp					4/185	9/100	8/41	4/14	6/68	31/561
	Roots					4/185	1/100			5/68	10/561
Female	# Individuals	3	4	5	2	5	10	1	2	3	35
	None/enamel	52/60	51/62	85/110	18/42	40/90	34/142	7/13	1/29	4/13	292/561
	Dentin	8/60	11/62	25/110	24/42	49/90	99/142	6/13	16/29	7/13	245/561
	Pulp					1/90	7/142		8/29	2/13	18/561
	Roots						2/142		4/29		6/561
Maxilla	None/enamel	41/47	39/45	73/90	28/53	52/125	44/118	7/22	2/21	11/39	297/560
	Dentin	6/47	6/45	17/90	25/53	69/125	67/118	10/22	14/21	23/39	237/560
	Advanced					4/125	7/118	5/22	5/21	5/39	26/560
Mandible	None/enamel	27/36	38/61	49/58	18/37	74/150	39/124	10/32		9/42	264/562
	Dentin	9/36	23/61	9/58	19/37	71/150	73/124	19/32	11/22	25/42	259/562
	Advanced					5/150	12/124	3/32	4/22	8/42	39/562
Total	# Individuals	4	6	7	5	15	14	6	3	9	69
	None/enamel	68/83	77/106	122/148	46/90	126/275	83/242	17/54	2/43	20/81	561/1122
	Dentin	15/83	29/106	26/148	44/90	140/275	140/242	29/54	25/43	48/81	496/1122
	Advanced					9/275	19/242	8/54	16/43	13/81	65/1122

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 34 males, 35 females.

Temporal Changes in Attrition

Since there were significant sex differences in the prevalence of advanced attrition in the total Non Nok Tha sample, sex differences may be present in the group sub-samples (Table 5.95). Sample sizes in the Early Group are quite small, but there are no significant sex differences in the prevalence of advanced dental attrition. In the Late Group, however, male teeth have more advanced attrition than female teeth in the maxillary premolars, mandibular premolars and incisors, maxillary (8.6% : 1.8%) and mandibular (14.5% : 3.9%) total teeth, and in the overall total (11.4% : 2.9%). These differences may be a function of different age-at-death distributions (Table 5.96), and in fact the female Late Group tooth sample is lacking in old adults.

Advanced attrition increases in Late Group males (5.0% : 11.5%), a significant difference (χ^2=7.716, df=1, p=0.005). Advanced attrition declines in Late Group females (5.8% : 2.9%), nearly attaining statistical significance (χ^2=2.629, df=1, p=0.105). Controlling for age (Table 5.95), the increase in advanced attrition in the male teeth is accounted for by an increase in the middle-age interval. In the middle-aged female teeth advanced attrition <u>declines</u> in the Late Group (7.9% : 0.8%). When the sexes are combined, there is a significant increase in the prevalence of advanced attrition in the middle-aged tooth sample (3.7% : 8.3%), while the prevalence in old teeth is approximately equal (25.3% : 22.7%).

Table 5.95. Advanced Dental Attrition, By Sex and Group, in Adult and Adolescent (>15 years) Permanent Teeth from Non Nok Tha

(# of Individuals) Affected/Observed teeth Jaw/Tooth Class	Early Group (EP 1-3, MP 1-3)						Late Group (MP 4-8)					
	Male (16)		Female (21)		Statistic		Male (21)		Female (19)		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
Maxilla Molars	1/51	2.0	3/75	4.0	FET	0.647	2/58	3.4	0/42	0.0	FET	0.508
Premolars	1/41	2.4	4/57	7.0	FET	0.396	**9/48**	**18.8**	**0/35**	**0.0**	**FET**	**0.008**
Canines	2/19	10.5	2/23	8.7	FET	1.000	2/17	11.8	0/11	0.0	FET	0.505
Incisors	2/20	10.0	1/29	3.4	FET	0.559	0/29	0.0	2/23	8.7	FET	0.191
Maxillary Teeth	6/131	4.6	10/184	5.4	χ^2=0.116	0.734	**13/152**	**8.6**	**2/111**	**1.8**	**χ^2=5.436**	**0.020**
Mandible Molars	1/65	1.5	4/80	5.0	FET	0.380	3/53	5.7	3/51	5.9	FET	1.000
Premolars	4/43	9.3	2/49	4.1	FET	0.413	**7/39**	**17.9**	**1/32**	**3.1**	**FET**	**0.065**
Canines	0/22	0.0	1/23	4.3	FET	1.000	6/21	28.6	1/17	5.9	FET	0.104
Incisors	3/17	17.6	4/28	14.3	FET	1.000	**5/32**	**15.6**	**0/28**	**0.0**	**FET**	**0.055**
Mandibular Teeth	8/147	5.4	11/180	6.1	χ^2=0.066	0.797	**21/145**	**14.5**	**5/128**	**3.9**	**χ^2=8.826**	**0.003**
Total Advanced Attrition	14/278	5.0	21/364	5.8	χ^2=0.164	0.685	**34/297**	**11.4**	**7/239**	**2.9**	**χ^2=13.60**	**0.000**

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10).

Table 5.96. Prevalence of Advanced Attrition by Sex, Age and Group in Adult Permanent Teeth

Sex / Age Category		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	Test	*p*
Male	Young	0/79	0.0	0/62	0.0		
	Middle-aged	**0/132**	**0.0**	**26/194**	**13.4**	**χ^2=19.224**	**0.000**
	Old	7/44	15.9	8/38	21.1	χ^2=0.361	0.548
Female	Young	0/215	0.0	0/59	0.0		
	Middle-aged	**9/114**	**7.9**	**1/111**	**0.8**	**FET**	**0.006**
	Old	12/31	38.7	2/6	33.3	FET	1.000
Total	Young	0/294	0.0	0/121	0.0		
	Middle-aged	**9/246**	**3.7**	**27/325**	**8.3**	**χ^2=5.123**	**0.024**
	Old	19/75	25.3	10/44	22.7	χ^2=0.102	0.749

Note: Only individuals with age estimated in five-year intervals are included here: 65 individuals: 31 males, 33 females, 1 ?sex. Young=15-35 years, middle=35-50 years, old=50-60+ years. A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10).

Summary of Dental Attrition

In the Non Nok Tha subadult permanent tooth sample, dentin exposure of the first molar and incisors is noted by the age of 15 years (14.3%, 5/35). In the adult permanent teeth, dental attrition affects the enamel (46.5%), exposes the dentin (45.3%), and uncommonly exposes the pulp (5.0%) and extends to the roots (1.3%). Advanced dental wear is noted in the premolars, canines and incisors in this population. There is a statistically significant greater prevalence of advanced wear in male teeth (8.1%) than female teeth (4.6%), but the older aged male tooth sample is also greater than that in the females. Advanced attrition is first observed in male teeth at age 35-40 years (2.2%) and in female teeth at age 40-45 years (6.3%).

There is an increase in advanced attrition in the Late Group at Non Nok Tha (5.5% : 7.6%). This change is mirrored in the male teeth (5.0% : 11.4%), because of an increase in advanced attrition in middle-age. In female teeth, advanced attrition declines in the Late Group (5.8% : 2.9%), also attributed to a decline in middle-age.

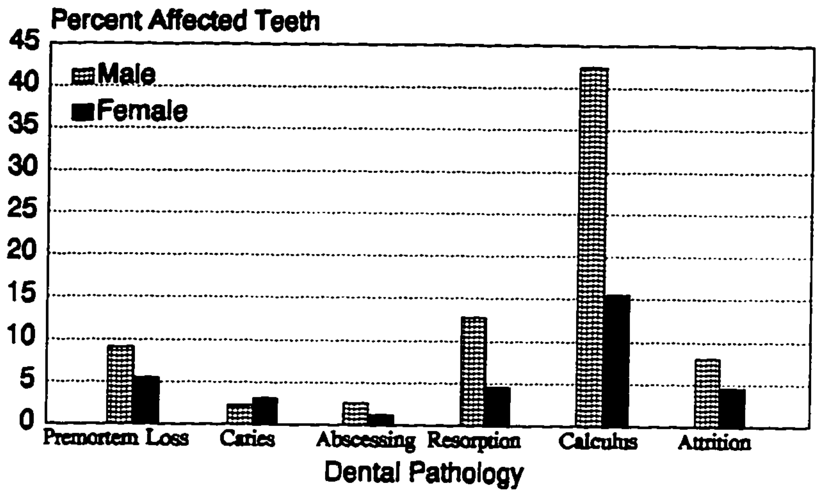


Figure 5.23. Non Nok Tha Adult Dental Pathologies

Summary of Non Nok Tha Adult Dental Pathology

Observations of dental pathologies in the permanent teeth of the adults (> 15 years of age) from Non Nok Tha are summarized in this section. Caries (2.8%) and abscessing (2.6%) are rare, while premortem tooth loss (7.4%) is slightly more common. Advanced degrees of alveolar resorption (moderate and marked observations) are observed in 9.1% of the tooth sockets, while advanced calculus is noted on 30.5% of the teeth. Advanced dental attrition (pulp exposure and/or wear to the roots) is seen in only 6.3% of the teeth. Male teeth and sockets have a significantly higher frequency of each of these pathologies than those of females (Figure 5.23), except in the occurrence of caries.

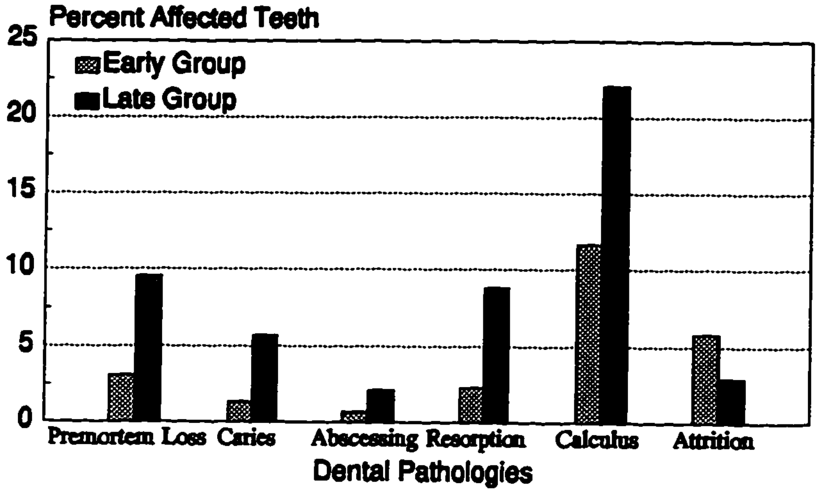


Figure 5.24. Female Dental Pathologies Over Time

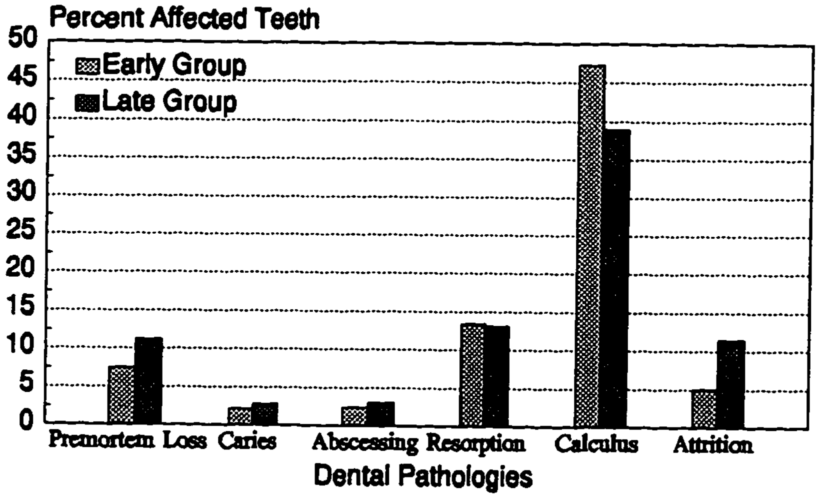


Figure 5.25. Male Dental Pathologies Over Time

There is a trend toward increased frequencies of these dental pathologies over time in the female adults from Non Nok Tha (Figure 5.24). The only exception is the decline in frequency of advanced dental attrition, a change attributed to a decline in advanced attrition in the middle age intervals. The decline in advanced attrition is likely to be a factor in the increased caries frequency, while the increase in advanced calculus is a factor in increased resorption and abscessing and subsequently premortem tooth loss.

In the adult males from Non Nok Tha (Figure 5.25), the picture is less clear. The frequency of caries, abscessing and advanced alveolar resorption increase only slightly in the Late Group (not statistically significant), while there are significant increases in premortem tooth loss (especially in the maxillary teeth), and in advanced dental attrition. The presence of advanced calculus, in contrast, declines in the Late Group.

These distinctly different patterns of temporal change in dental pathologies might suggest that each gender was experiencing different pressures.

OSTEOARTHRITIS

Appendicular Osteoarthritis

The appendicular skeletons from Non Nok Tha were observed for signs of osteoarthritis. Osseous changes included porosis of the articular surface, lipping, or new bone production around the rim of the articular surface, eburnation or polishing of the articular surface, and ossific nodule formation. As discussed in the methods, systematic scoring was done of the porosis and lipping, and textual descriptions were made of eburnation and any other variation, and will be discussed by functional unit.

Osteoarthritic changes of the appendicular skeleton, scored in adults, twenty years and older, are summarized in Table B.34. In the upper limb, 75.3% (1725/2291) of the articular surfaces have no osteoarthritic changes. The most common type of articular change is lipping (Figure 5.26), found in 23.8% (545/2291) of the surfaces, with uncommon observations of porosis (0.7%, 17/2291), and the combination of lipping and porosis (0.2%, 4/2291). There are only 17 observations of moderate osteoarthritis in the affected upper limb surfaces (17/566, 3.0%), and no marked observations.

As expected, because of the effects of weight-bearing, there are more observations of osteoarthritic change (34.6%, 952/2749) in the lower limb, with articular lipping still the most predominant type of arthritis (34.4%, 947/2749). Advanced osteoarthritis (moderate and marked) occurs in 5.4% of the affected articular surfaces (51/952), the majority of these observations in the bones of the foot (specifically, the distal facet of the first metatarsal). The presence of relatively few advanced observations in either limb suggests that further analysis should rely on the presence of articular changes (of any kind and all degrees) against the absence of those changes.

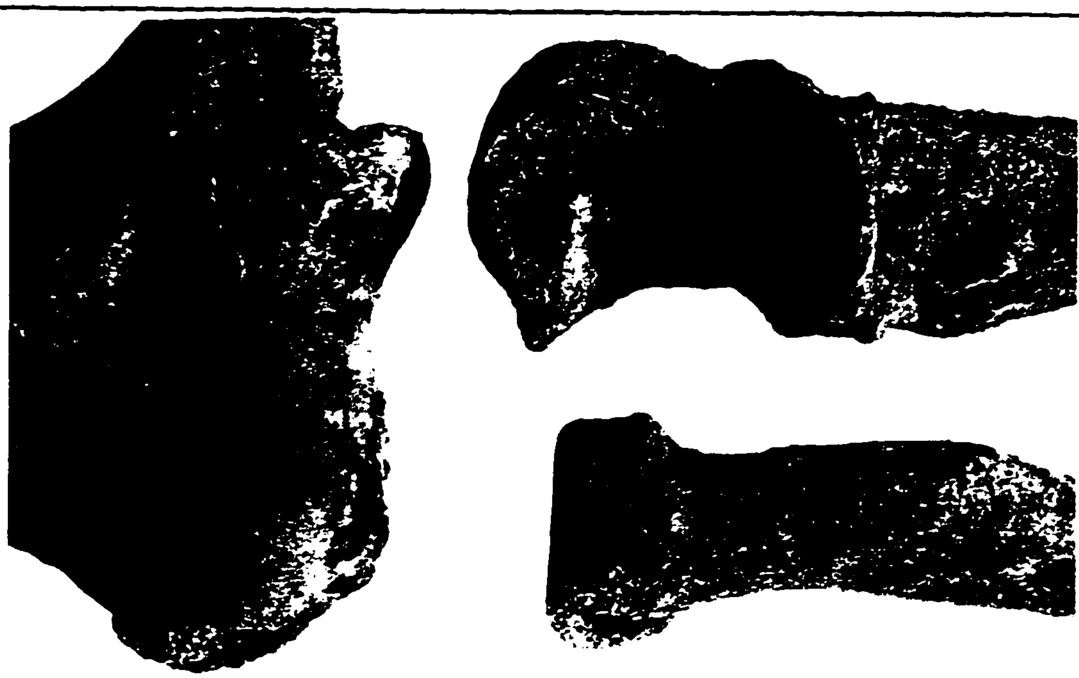


Figure 5.26. Osteoarthritis of the Elbow Articular Surfaces

Table 5.97. Prevalence of Appendicular Osteoarthritis, By Sex, in Non Nok Tha Adults

Functional Unit Osteoarthritis Present		Male		Female		Statistic	
		A/O	%	A/0	%	χ^2 Value	Probability
Upper Limb	R shoulder	27/95	28.4	10/63	15.9	**3.326**	**0.068**
	L shoulder	20/79	25.3	9/62	14.5	2.480	0.115
	R elbow	56/120	46.7	35/99	35.4	**2.859**	**0.091**
	L elbow	35/105	33.3	35/111	31.5	0.080	0.777
	R wrist	24/67	35.8	19/46	41.3	0.348	0.555
	L wrist	18/64	28.1	12/44	27.3	0.009	0.923
	R hand	84/315	26.7	57/285	20.0	**3.699**	**0.054**
	L hand	81/402	20.1	44/334	13.2	**6.296**	**0.012**
Lower Limb	R pelvis	32/71	45.1	27/73	37.0	0.973	0.324
	L pelvis	31/73	42.5	32/78	41.0	0.032	0.858
	R knee	43/134	32.1	30/106	28.3	0.401	0.526
	L knee	38/142	26.8	21/106	19.8	1.617	0.204
	R ankle	43/65	66.2	35/70	50.0	**3.605**	**0.058**
	L ankle	39/66	59.1	19/57	33.3	**8.143**	**0.004**
	R foot	180/420	42.9	119/481	24.7	**33.191**	**0.000‡**
	L foot	150/381	39.4	113/426	26.5	**15.103**	**0.000**

Note: Osteoarthritis of any type and degree. A=affected, O=observed, R=right, L=left. Includes 106 individuals: 52 males, 54 females. **Bold** indicates statistical significance. ‡ Indicates statistically greater prevalence of advanced osteoarthritis (vs none/slight) in males.

There is more appendicular osteoarthritis in the Non Nok Tha males than in the females (Table 5.97) in every functional unit except the right wrist. These sex differences reach statistical significance in the right shoulder, right elbow, the hands, the ankles, and the feet. While arthritic changes are related to age, the upper limb differences may also reflect heavier use and handedness in males, while the lower limb osteoarthritis reflects greater weight in males.

An examination of the prevalence of advanced osteoarthritic change (moderate and marked observations of either porosis or lipping), finds a statistically greater prevalence of advanced osteoarthritis in the right foot articular surfaces of males. The absence of other significant differences reflects the rarity of advanced osteoarthritis in this sample. In both sexes, the right side has a greater prevalence of osteoarthritis than the left side, a finding not surprising given the relative majority of right handed people.

Examining the age-at-death distribution of osteoarthritic changes in the appendicular skeletons from Non Nok Tha (Table 5.98) shows the presence of slight articular changes from early adulthood in both sexes. In males, the first advanced osteoarthritis is noted in the bones of the foot (35-40 years), followed by the shoulder, elbow, wrist, knee and ankle at age 45-50 years. In females, the first advanced observations are noted in the articular surfaces of the pelvis (35-40 years), followed by the foot (40-45 years), knee (50-55 years) and finally the surfaces of the upper limb. These timing differences are interesting in that there is apparent sex specificity: the greater weight of males resulting in early onset of osteoarthritis of the feet, and the effects of parturition in the earliest advanced observations in females. Also suggested in this table is that the increased prevalence of osteoarthritis in male articular surfaces is not especially a function of an older aged sample, but rather an increased incidence and earlier onset of osteoarthritic changes.

Table 5.98. Summary of Appendicular Osteoarthritis (All Kinds and Degrees) By Age and Sex in Non Nok Tha Adults

Sex/Functional Unit Articular Surfaces A/O		Age Interval (in years)								Total
		18-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
UPPER LIMB										
Male	Shoulder	0/5	0/13	4/14	14/70	6/28	**10/14**		9/23	43/167
	Elbow	2/10	4/14	1/17	22/61	16/37	**25/36**		16/33	85/208
	Wrist	1/6	1/12	1/9	14/36	5/22	**10/22**		9/20	41/127
	Hand	1/32	0/48	5/51	40/210	17/108	45/110		52/126	160/685
Female	Shoulder	0/19	0/22	0/1	7/26	6/29	0/2	0/2	**5/17**	18/118
	Elbow	0/23	5/35	0/10	5/24	32/56	0/1	4/11	**15/26**	61/186
	Wrist	0/10	1/15	0/1	8/14	13/24	0/2	3/8	**6/12**	31/86
	Hand	4/62	4/108	0/10	26/84	340/148	2/14	4/42	25/105	99/573
LOWER LIMB										
Male	Pelvis	0/5	0/8	3/14	25/39	9/26	12/21		**14/26**	63/139
	Knee	0/11	0/11	6/22	24/82	10/51	**20/40**		16/31	76/248
	Ankle	2/6	3/10	3/3	24/38	10/19	**18/21**		9/13	69/110
	Foot	3/22	4/68	6/13	**95/254**	40/125	105/146		42/97	295/725
Female	Pelvis	0/16	2/31	0/8	**13/25**	21/32	0/1	3/4	15/21	54/138
	Knee	0/26	2/41	0/16	1/14	14/33	0/1	**9/11**	10/16	36/158
	Ankle	4/15	5/18	1/3	5/8	5/11	2/2	4/7	15/21	41/85
	Foot	7/86	19/154	4/30	7/14	**42/121**		30/50	63/131	172/586

Note: A=affected, O=observed. Only individuals with specific (5 year interval) age estimates are included here: 40 males, 36 females. **Bold** indicates first occurrence of advanced osteoarthritis.

Temporal Change in Appendicular Osteoarthritis

Examining the frequency of osteoarthritis over time (Table 5.99), documents a greater prevalence of arthritic changes in the Late Group in all of the functional units. The differences are statistically significant in most of the upper limb units, and in the articular surfaces of the feet. In both samples, the right and left side dichotomy is maintained.

Table 5.99. Prevalence of Appendicular Osteoarthritis, By Side and Group, in Non Nok Tha Adults

Functional Unit Osteoarthritis Present		Early Group		Late Group		Statistic	
		A/O	%	A/0	%	χ^2 Value	*p*
Upper Limb	R shoulder	15/78	19.2	22/79	27.8	1.618	0.203
	L shoulder	11/73	15.1	18/68	26.5	**2.802**	**0.094**
	R elbow	41/113	36.3	50/103	48.5	**3.322**	**0.068**
	L elbow	31/121	25.6	39/64	41.5	**6.068**	**0.014**
	R wrist	21/57	36.8	22/56	39.3	0.072	0.789
	L wrist	9/47	19.1	21/59	35.6	**3.486**	**0.062**
	R hand	60/275	21.8	81/325	24.9	0.799	0.371
	L hand	47/355	13.2	78/381	20.5	**6.819**	**0.009**
Lower Limb	R pelvis	27/71	38.0	32/73	43.8	0.502	0.479
	L pelvis	26/73	35.6	37/78	47.4	2.167	0.141
	R knee	34/124	27.4	39/116	33.6	1.089	0.297
	L knee	27/125	21.6	32/123	26.0	0.667	0.414
	R ankle	28/55	50.9	50/79	63.3	2.044	0.153
	L ankle	21/50	42.0	36/72	50.0	0.759	0.384
	R foot	106/377	28.1	193/524	36.8	**7.511**	**0.006†**
	L foot	84/292	28.8	178/515	34.7	**2.981**	**0.084‡**

Note: Osteoarthritis of any type or degree. A=affected, O=observed, R=right, L=left. Includes 105 individuals: 51 males, 54 females. **Bold** indicates statistically significant difference. † There is a statistically greater prevalence of advanced osteoarthritis in the Late Group, ‡ There is a statistically greater prevalence of advanced osteoarthritis in the Early Group.

When the frequency of advanced observations (against none/slight) in the group sub-samples is examined, there is a significantly more advanced osteoarthritis in the Late Group in the right foot, and a greater prevalence of advanced osteoarthritis in the left foot in the Early Group. These findings are enigmatic, and are more likely to reflect a failure to accurately identify the metatarsals and phalanges, by side than an actual change in arthritis pattern.

An increase in osteoarthritis in the Late Group at Non Nok Tha is also found when the male and female articular surfaces are examined separately over time (Table 5.100). There is a statistically greater prevalence of osteoarthritis in the shoulder, elbow, pelvis, ankle, and foot in the Late Group males, and a statistically greater prevalence of osteoarthritis in the elbow, hand, and foot in the Late Group females. Still, these differences may reflect differing age distributions in the group sub-samples, requiring an analysis controlling for age. Unfortunately, again, the problems encountered with estimating the age-at-death of the human skeleton compound examination of age-related pathology.

Table 5.100. Appendicular Osteoarthritis, By Sex and Group, in Non Nok Tha Adults

Functional Unit Osteoarthritis Present Affected/Observed		Male (N=51)						Female (N=54)					
		Early (n=22)		Late (n=29)		Statistic		Early (n=23)		Late (n=31)		Statistic	
		A/O	%	A/O	%	χ^2	p	A/O	%	A/O	%	χ^2	p
Upper Limb	Shoulder	16/82	19.5	31/91	34.1	**4.68**	**0.032**	10/69	14.5	9/56	16.1	0.06	0.807
	Elbow	39/111	35.1	52/110	47.3	**3.36**	**0.067**	33/123	26.8	37/87	42.5	**5.65**	**0.017**
	Wrist	13/52	25.0	29/77	37.7	2.27	0.132	17/52	32.7	14/38	36.8	0.17	0.682
	Hand	64/318	20.1	101/399	25.3	2.69	0.101	43/312	13.8	58/307	18.9	**2.96**	**0.085**
Lower Limb	Pelvis	23/66	34.8	40/78	51.3	**3.92**	**0.048**	30/78	38.5	29/73	39.7	0.03	0.874
	Knee	34/135	25.2	47/141	33.3	2.21	0.137	27/114	23.7	24/98	24.5	0.02	0.891
	Ankle	24/46	52.2	57/83	68.7	**3.45**	**0.063**	25/59	42.4	29/68	42.6	0.00	0.975
	Foot	107/287	37.3	222/512	43.4	**2.80**	**0.094**	83/382	21.7	149/525	28.4	**5.14**	**0.023**

Note: Early Group (EP 1-3, MP 1-3), Late Group (MP 4-8). Osteoarthritis of all types and degrees. Includes only individuals with an estimated age interval: 51 males, 54 females. **Bold** indicates statistical significance (α=0.05).

Using only individuals with interval age estimates and collapsing them into young, middle and old adults, will offer some control over age (Table 5.101). The results are irregular. In the upper limb, there are statistically significant increases in osteoarthritis in the middle-aged male, and young and old female articular surfaces, but there is a decline in osteoarthritis in old aged males over time. While in females there is an increase in osteoarthritis of both young and old articular surfaces and little change in the middle-age category. This pattern repeats in the lower limb.

Table 5.101. Non Nok Tha Appendicular Osteoarthritis By Group and Sex, Controlling for Age

Sex/Age Category Articular Surfaces		Early Group		Late Group		Statistic	
		A/O	%	A/O	%	χ^2	p
Upper Limb							
Male	Young	14/138	10.1	9/95	9.5	0.028	0.866
	Middle	51/283	18.0	174/465	37.4	**31.476**	**0.000**
	Old	61/111	55.0	28/89	31.5	**11.040**	**0.001**
Female	Young	6/197	3.0	9/120	7.5	**3.282**	**0.070**
	Middle	84/250	33.6	48/167	28.7	1.092	0.296
	Old	17/97	17.5	45/120	37.5	**10.486**	**0.001**
Lower Limb							
Male	Young	12/74	16.2	18/119	15.1	0.041	0.839
	Middle	125/380	32.9	267/482	55.4	**43.381**	**0.000**
	Old	49/75	65.3	32/92	34.8	**15.439**	**0.000**
Female	Young	13/274	4.7	31/170	18.2	**21.387**	**0.000**
	Middle	49/137	35.8	61/125	48.8	**4.559**	**0.033**
	Old	71/131	54.2	78/130	60.0	0.896	0.344

Note: Includes osteoarthritis of any kind or degree. A=affected, O=observed, young (15-35 years), middle (35-50 years), and old (>50 years). Includes 51 males and 54 females with age interval estimates. Early Group (EP 1-3, MP 1-3), Late Group (MP 4-8). **Bold** indicates statistical significance (α=0.10).

While interpreting these results is a challenge, given the depth of the deposits and the length of occupation, the fundamental observation is that the increase in osteoarthritis in the Late Group is not related to an older age-at-death sample.

Summary of Appendicular Osteoarthritis at Non Nok Tha

Osteoarthritis of the appendicular skeleton occurs in 30.1% of the articular surfaces examined in Non Nok Tha adults (1518/5040). Osteoarthritis is more prevalent in the lower limb (34.6%, 952/2749), than in the upper limb (24.7%, 566/2291), and more common in males than females. The articular surfaces of the ankle are most commonly affected with osteoarthritis in males, while in females it is the articular surfaces of the pelvis. There is an obvious trend in every functional unit examined for greater osteoarthritis of the right articular surfaces than the left surfaces. Slight osteoarthritis is noted in both sexes by early adulthood (20-25 years), while advanced osteoarthritis is first noted in the foot bones of males and in the pelvis of females by age 35-40 years.

There is a greater prevalence of osteoarthritis in the Late Group at Non Nok Tha than in the Early Group, noted in both males and females, and in the combined sample. When age-at-death is controlled, there is an increase in appendicular osteoarthritis in middle-age males and a decrease in old aged males in the Late Group. In females, there is an increase is osteoarthritis in both the upper and lower limbs in the Late Group.

Axial Skeleton Osteoarthritis

Temporo-Mandibular Joint Osteoarthritis

The temporo-mandibular joint (TMJ), made up of the mandibular condyle and the mandibular fossa of the occiput, was scored for osteoarthritic changes, and the results are summarized in Table 5.102. Lipping is the only type of osteoarthritis noted in these joints, with no observations of advanced osteoarthritis (moderate or marked degrees). There is no apparent difference between the frequency of osteoarthritis in the right (2.7%) and left (2.4%) mandibular condyles, but there is an apparent side difference in the mandibular fossa osteoarthritis, the right (7.0%) being greater than the left (2.4%).

Table 5.102. Temporo-Mandibular Joint Osteoarthritis in Non Nok Tha Adults

Articular Surface Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
R Mandibular Condyle	None	20/20	100.0	16/17	94.1	36/37	97.3
	Slight lipping	0/20	0.0	1/17	5.9	1/37	2.7
L Mandibular Condyle	None	25/25	100.0	16/17	94.1	41/42	97.6
	Slight lipping	0/25	0.0	1/17	5.9	1/42	2.4
R Mandibular Fossa	None	24/26	92.3	16/17	94.1	40/43	93.0
	Slight lipping	2/26	7.7	1/17	5.9	3/43	7.0
L Mandibular Fossa	None	25/26	96.2	16/16	100.0	41/42	97.6
	Slight lipping	1/26	3.8	0/16	0.0	1/42	2.4

Note: R=right, L=left, A=affected, O=observed. Includes 63 individuals: 33 males, 30 females.

The prevalence of osteoarthritis in female mandibular condyles (5.9%) is greater than in males (0.0%), but osteoarthritis of the mandibular fossae is greater in males (5.8%) than females (3.0%) [Table 5.103]. However, the differences are not statistically significant. In males, osteoarthritis of the TMJ is not noted until age 55-60, while in females, osteoarthritic changes are noted at 35-40 years and 40-45 years.

Table 5.103. Prevalence of Temporo-Mandibular Joint Osteoarthritis, By Sex, in Non Nok Tha Adults

Articulation · Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
Mandibular Condyle	0/45	0.0	2/34	5.9	FET	0.182
Mandibular Fossa	3/52	5.8	1/33	3.0	FET	1.000
Total	3/97	3.1	3/67	4.5	FET	0.689

Note: All types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability). Includes 63 individuals: 33 males, 30 females.

Temporal Change in TMJ Osteoarthritis

There are no observations of osteoarthritis in male TMJ from the Early Group, and only three observations in the Late Group (5.8%) [Table 5.104]. In females, the prevalence of osteoarthritis of the TMJ is nearly identical (4.3% : 4.8%) over time. None of the differences is statistically significant.

Table 5.104. Temporal Change in Temporo-Mandibular Joint Osteoarthritis in Non Nok Tha Adults

TMJ Osteoarthritis Present	Early Group		Late Group		Statistic	
	A/O	%	A/0	%	Test	Probability
Male	0/45	0.0	3/52	5.8	FET	0.246
Female	2/46	4.3	1/21	4.8	FET	1.000
Total	2/91	2.2	4/73	5.5	FET	0.408

Note: Sides combined, all types and degrees of osteoarthritis, TMJ=temporo-mandibular joint, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability),. Includes 63 individuals: 33 males, 30 females.

In summary, there is no apparent side difference in the occurrence of osteoarthritis of the TMJ in adults from Non Nok Tha. As well, there are no statistically significant differences in prevalence between males and females, although osteoarthritis is slightly more common in females (4.5%) than males (3.1%). Osteoarthritis of the TMJ is also more common in the Late Group (5.5%) than the Early Group (2.2%), a difference largely attributable to an increase in male osteoarthritis of these joint surfaces.

Cervical Vertebral Osteoarthritis

Occipital-Cervical Complex

The prevalence of osteoarthritis in the occipital-cervical complex of articulations in Non Nok Tha adults, is summarized in Table 5.105. Osteoarthritis is the rule in the articulations of the occiput and first cervical vertebra (71.7%), less common in the first and second cervical interface (C1-2 47.9%, 67/140), and still less common in the dens facets (25.0%, 14/56). The predominant type of osteoarthritis found in these facets is articular lipping. Advanced (moderate and marked) observations are uncommon, seen only in the C1-2 interface (0.7%) and the dens (5.4%).

Table 5.105. Occipital-Cervical Complex Osteoarthritis in Non Nok Tha Adults

Articular Surfaces	Osteoarthritis Present	Male		Female		Total	
		A/O	%	A/O	%	A/O	%
Occiput-C1	None	17/87	19.5	22/51	43.1	39/138	28.3
	Slight lipping	70/87	80.5	29/51	56.9	99/138	71.7
C1-2	None	39/85	45.9	34/55	61.8	73/140	52.1
	Slight lipping	45/85	52.9	21/55	38.2	66/140	47.1
	Moderate porosis	1/85	1.2	0/55	0.0	1/140	0.7
Dens Facets	None	24/36	66.7	18/20	90.0	42/56	75.0
	Slight lipping	10/36	27.8	1/20	5.0	11/56	19.6
	Moderate lipping	2/36	5.6	1/20	5.0	3/56	5.4

Note: Sides combined, C=cervical, A=affected, O=observed. Includes 59 individuals: 33 males and 26 females.

The prevalence of advanced observations is about the same in both males and females. The prevalence of osteoarthritis in male occipital-cervical articulations is statistically greater than in female articulations in every interface examined (Table 5.106).

Table 5.106. Prevalence of Occipital-Cervical Complex Osteoarthritis, By Sex

Articulation Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
Occiput-C1	70/87	80.5	29/51	56.9	**χ^2=8.830**	**0.003**
C1-2	46/85	54.1	21/55	38.2	**χ^2=3.398**	**0.065**
Dens	12/36	33.3	2/20	10.0	**χ^2=3.733**	**0.053**

Note: All types and degrees of osteoarthritis, C=cervical, A=affected, O=observed. Includes 59 individuals: 33 males, 26 females. **Bold** indicates statistical significance (α=0.10).

The male sample of occiput-cervical articulations is skewed toward the older age intervals, suggesting that the sex differences discussed above may be related to an older age-at-death distribution. By controlling for age in broad categories (young, middle, old), these differences may be illuminated further (Table 5.107). The absence of statistically significant differences, with the exception of the prevalence of osteoarthritis of the occiput-C1 in young adults, suggests that the age structure of the population is a factor in the increased prevalences of osteoarthritis of the upper axial skeleton in Non Nok Tha males.

Table 5.107. Occipital-Cervical Complex Osteoarthritis in Non Nok Tha Adults

Articulation/Age Category Osteoarthritis Present		Male		Female		Statistic	
		A/O	%	A/O	%	Test	*p*
Occiput-C1	young adult	13/14	92.9	5/15	33.3	χ^2**=10.9**	**0.001**
	middle-aged	32/47	68.1	17/28	60.7	χ^2=0.42	0.516
	old-aged	23/24	95.8	5/6	83.3	FET	0.366
C1-2	young adult	4/12	33.3	5/11	45.5	FET	0.680
	middle-aged	27/49	55.1	12/28	42.9	χ^2=1.07	0.301
	old-aged	15/22	68.2	4/10	40.0	FET	0.244
Dens Facets	young adult	0/5	0.0	0/3	0.0		
	middle-aged	8/22	36.4	2/10	20.0	FET	0.440
	old-aged	4/8	50.0	0/4	0.0	FET	0.208

Note: Sides combined, C=cervical, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). Includes 59 individuals: 33 males, 26 females. **Bold** indicates statistical significance (α=0.10).

Temporal Changes in Occipital-Cervical Osteoarthritis

The temporal changes in osteoarthritis prevalence of these upper cervical articulations do not show a uniform trend when examined by sex (Table 5.108). In the male sample, there is a decrease in osteoarthritis of the occiput-C1 (86.8% : 75.5%) and the C1-2 interface (61.0% : 47.7%), and a statistically significant decrease in osteoarthritis of the dens in the Late Group (56.3% : 15.0%). In the female sample, the prevalence of osteoarthritis of the occiput-C1 (51.5% : 66.7%), and C1-2 interface (35.7% : 40.7%) <u>increases</u> in the Late Group, while osteoarthritis of the dens disappears (18.2% : 0.0%). However, none of these changes is statistically significant. When the sexes are combined there are no statistically significant changes in the prevalence of osteoarthritis of the occiput-C1 and C1-2 interfaces. However, there is a big decline in osteoarthritis of the dens facets (40.7% : 10.3%) in the Late Group, a trend evident in both males and females.

Table 5.108. Temporal Change in Occipital-Cervical Complex Osteoarthritis in Non Nok Tha Adults

Sex/Articulations Osteoarthritis Present		Early Group		Late Group		Statistic	
		A/O	%	A/0	%	Test	Probability
Male	Occiput-C1	33/38	86.8	37/49	75.5	χ^2=1.748	0.186
	C1-2	25/41	61.0	21/44	47.7	χ^2=1.500	0.221
	Dens	9/16	56.3	3/20	15.0	**χ^2=6.806**	**0.009**
Female	Occiput-C1	17/33	51.5	12/18	66.7	χ^2=1.090	0.296
	C1-2	10/28	35.7	11/27	40.7	χ^2=0.147	0.701
	Dens	2/11	18.2	0/9	0.0	FET	0.479
Total	Occiput-C1	50/71	70.4	49/67	73.1	χ^2=0.125	0.724
	C1-2	35/69	50.7	32/71	45.1	χ^2=0.448	0.503
	Dens	11/27	40.7	3/29	10.3	**χ^2=6.890**	**0.009**

Note: Sides combined, all types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability), C=cervical. Includes 59 individuals: 33 males, 26 females. **Bold** indicates statistical significance (α=0.10).

Summary of Cervical-Occiput Osteoarthritis

The most common kind of osteoarthritic change in the upper axial skeleton at Non Nok Tha is articular lipping. The prevalence of osteoarthritis in the articular surfaces of the occiput-C1 is 71.9%, in the C1-2 interface, 47.1%, and in the dens, 19.6%. Advanced changes are observed in only four facets. Although there is a greater prevalence of osteoarthritis in male articular surfaces at these joints, when age is controlled, there is only one statistically significant difference. Examining the prevalence of osteoarthritis over time, upper axial facets in males show a decline over time, while in female articular surfaces, there is an increase in the occiput-C1 and C1-2 interfaces, and a decline in the dens facets. When the sexes are combined, only the dens facets have a statistically significant change (decline) over time.

Third Through Seventh Cervical Vertebral Osteoarthritis

The remainder of the cervical spine (inferior C2-C7) in 62 adults from Non Nok Tha was surveyed for the prevalence of osteoarthritis of the posterior articular facets and the vertebral end-plates (Table B.35). Osteoarthritis is noted in slightly more than one quarter of the cervical articular facets (168/635, 26.5%), with the predominant observation of lipping (167/168, 99.4%). Advanced osteoarthritis of the cervical facets is rare (0.2%). Osteoarthritis is more common at the seventh cervical-first thoracic interface [C7-T1](33.9%, 39/115).

In the cervical end-plates, lipping (51.0%, 25/49) and porosis (32.7%, 16/49) are the primary types of osteoarthritis in the affected end-plates (49/352, 13.9%). Osteoarthritis of the end-plates is fairly consistent across the cervical spine, occurring in less than 20% of observations at each level.

Osteoarthritis of the cervical facets and vertebral end-plates is more common in males than in females (Table 5.109). There are statistically significant sex differences in every level of the cervical articular facets except the C2-3 and C4-5. In male facets, there is a consistent prevalence of osteoarthritis across the spine, with the highest prevalence at the C7-T1 interface (44.1%, 30/68). In females, the highest prevalences (22.2% and 21.4% respectively) occur in the upper cervical spine (C2-3 and C4-5), a difference perhaps reflecting differences in the use of the head and neck.

In the cervical end-plates, again, there is more osteoarthritis in males (17.2%, 38/221) than in females (11/131, 8.4%), a difference which is statistically significant. Only in the first two levels of the cervical spine, however, do the sex differences reach statistical significance, primarily the result of an absence of osteoarthritis in the female cervical end-plates. In males the highest prevalence occurs at the C6-7 interface, while in females the highest prevalence occurs at the C7-T1 interface.

Table 5.109. Prevalence of Cervical Vertebral Osteoarthritis, By Sex, in Non Nok Tha Adults

CERVICAL Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
FACETS						
C2-3	17/61	27.9	8/36	22.2	χ^2=0.377	0.539
C3-4	20/67	29.9	6/41	14.6	**χ^2=3.222**	**0.073**
C4-5	18/67	26.9	9/42	21.4	χ^2=0.410	0.522
C5-6	23/65	35.4	4/39	10.3	**χ^2=8.007**	**0.005**
C6-7	20/58	34.5	4/44	9.1	**χ^2=8.965**	**0.003**
C7-T1	30/68	44.1	9/47	19.1	**χ^2=7.731**	**0.005**
Total	128/386	33.2	40/249	16.1	**χ^2=22.737**	**0.000**
END-PLATES						
C2-3	5/39	12.8	0/22	0.0	**FET**	**0.097**
C3-4	8/41	19.5	0/21	0.0	**FET**	**0.028**
C4-5	7/41	17.1	3/21	14.3	FET	0.544
C5-6	7/37	18.9	2/24	8.3	FET	0.224
C6-7	7/34	20.6	2/22	9.1	FET	0.224
C7-T1	4/29	13.8	4/21	19.0	FET	0.814
Total	38/221	17.2	11/131	8.4	**χ^2=5.312**	**0.021**

Note: All types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (one-tailed probability). Includes 62 individuals: 32 males and 30 females. **Bold** indicates statistical significance (α=0.10).

Examining the prevalence of cervical osteoarthritis by age (Table 5.110) may shed more light on the differences between the sexes at Non Nok Tha. The male sample is skewed toward the middle and old age intervals. Osteoarthritis of the cervical facets begins to appear by age 25-30 years in both sexes, while osteoarthritis of the cervical end-plates appears later in life, occurring in very small quantities until age 40-45 in males and age 45-50 in females.

Table 5.110. Cervical Vertebral Osteoarthritis By Age and Sex in Non Nok Tha Adults

CERVICAL Articulations % Affected/Observed		Age Interval (in years)								Total
		20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
FACETS										
Male	# Individuals	1	2	3	10	4	3	0	8	31
	# Facets	5	34	32	136	57	40		78	382
	Slight		5.9	40.6	36.0	29.8	45.0		30.8	32.2
	Advanced				0.7				1.3	0.5
Female	# Individuals	3	5	1	6	5	1	2	3	26
	# Facets	19	47	8	43	53	15	14	17	216
	Slight		10.6		30.2	22.6	6.7		17.6	15.7
END-PLATES										
Male	# End-plates	11	16	21	79	26	17		48	218
	Slight				3.8		58.8		35.4	13.8
	Advanced						17.6		6.3	2.8
Female	# End-plates	12	23	6	21	28	6	7	15	118
	Slight					7.1		14.3	40.0	7.6
	Advanced								6.7	0.8

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 31 males, 26 females.

Advanced observations are restricted to the oldest age intervals in both sexes. The earliest observations are found in the C3-4 and C4-5 intervals in the female interfaces in males, while the advanced observations are noted at the C6-7 and C7-T1 interfaces, also in males. The small sample sizes in the older age intervals in the female Non Nok Tha adults may be responsible for the lower prevalence of osteoarthritis in the females.

Temporal Change in Cervical Osteoarthritis

Males have more cervical vertebral osteoarthritis than females in both groups at Non Nok Tha (Table 5.111). The prevalence of osteoarthritis in the cervical facets increases in males over time (29.9% : 36.6%), with a dramatic increase in the C2-3 interface. In female cervical articular facets, there is a general decrease in osteoarthritis over time (18.4% : 14.7%), but the difference is not statistically significant. There is no apparent change in the distribution of osteoarthritis within the cervical segment of the spine.

In the cervical vertebral bodies, osteoarthritis also increases in male end-plates over time (11.4% : 22.4%), with the largest difference in the upper cervical interfaces (C2-C3, C3-C4). In the female cervical end-plates, while there is a general increase, few of the differences are statistically significant because of the small sample sizes. In the Late Group females, osteoarthritis is distributed more evenly across the cervical spine; while in the Early Group, all observations occur in the C7-T1 interface (perhaps attributable to small sample error).

Table 5.111. Cervical Vertebral Osteoarthritis, By Sex and Group, in Non Nok Tha Adults

CERVICAL Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	p	A/O	%	A/O	%	Test	p
FACETS												
C2-3	4/25	16.0	13/36	36.1	**χ^2=2.969**	**0.085**	3/12	25.0	5/24	20.8	FET	0.764
C3-4	10/30	33.3	10/37	27.0	χ^2=0.315	0.575	2/16	12.5	4/25	16.0	FET	0.566
C4-5	6/26	23.1	12/41	29.3	χ^2=0.310	0.577	4/13	30.8	5/29	17.2	FET	0.916
C5-6	8/30	26.7	15/35	42.9	χ^2=1.852	0.174	2/13	15.4	2/26	7.7	FET	0.901
C6-7	10/26	38.5	10./32	31.3	χ^2=0.330	0.566	3/22	13.6	1/22	4.5	FET	0.607
C7-T1	12/30	40.0	18/38	47.4	χ^2=0.369	0.543	3/21	14.3	6/26	23.1	FET	0.352
Total	50/167	29.9	78/219	35.6	χ^2=1.377	0.241	17/97	17.5	23/152	15.1	χ^2=0.252	0.616
END-PLATES												
C2-3	0/16	0.0	5/23	21.7	**FET**	**0.058**	0/9	0.0	0/13	0.0		
C3-4	1/17	5.9	7/24	29.2	**FET**	**0.069**	0/9	0.0	0/12	0.0		
C4-5	4/18	22.2	3/23	13.0	FET	0.358	0/7	0.0	3/14	21.4	FET	0.274
C5-6	2/18	11.1	5/19	26.3	FET	0.225	0/10	0.0	2/14	14.3	FET	0.330
C6-7	2/19	10.5	5/15	33.3	FET	0.114	0/11	0.0	2/11	18.2	FET	0.238
C7-T1	3/17	17.6	1/12	8.3	FET	0.444	3/11	27.3	1/10	10.0	FET	0.331
TOTAL	12/105	11.4	26/116	22.4	**χ^2=4.671**	**0.031**	3/57	5.3	8/74	10.8	FET	0.209

Note: FET=Fisher's Exact Test (one-tailed probability), A=affected, O=observed. Includes 62 individuals: 32 males, 30 females. **Bold** indicates statistical significance (α=0.10).

The lack of a large number of statistically significant differences over time, within each sex, suggests the sexes can be combined for further analysis. Again, examining change over time in the cervical vertebra (Table 5.112), controlling for age, there are mixed results in the articular facets. In young adults, there is a statistically significant decrease in osteoarthritis of the facets, while there is a significant increase in osteoarthritis in the middle-aged group, and an approximately equal prevalence in the old-age interval.

In the cervical end-plates, there is no osteoarthritis in the young adults, and in both middle and old age intervals, osteoarthritis increases. These results are rather enigmatic, and must be examined in light of the prevalence of osteoarthritis in the remainder of the spine.

Table 5.112. Cervical Vertebral Osteoarthritis, Controlling for Age, in Non Nok Tha Adults

Cervical Articulations Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
Cervical Facets						
Young Adult	16/72	22.2	4/73	5.5	**8.546**	**0.003**
Middle-aged Adult	31/129	24.0	80/215	37.2	**6.407**	**0.011**
Old-aged Adult	17/59	28.8	11/50	22.0	0.658	0.417
Cervical End-plates						
Young Adult	0/48	0.0	0/41	0.0		
Middle-aged Adult	4/79	5.1	14/98	14.3	**4.072**	**0.044**
Old-aged Adult	9/32	28.1	19/38	50.0	**3.464**	**0.063**

Note: A=affected, O=observed, young adult is 15-35 years, middle adult is 35-50 years and old is 50+ years. Includes only individuals with age-interval estimates: 57 individuals: 31 males, 26 females. **Bold** indicates statistical significance (α=0.10).

Summary of Cervical Osteoarthritis

Degenerative changes were observed in 26.5% of the cervical articular facets in Non Nok Tha adults, and in 13.9% of the cervical vertebral bodies. Male articular surfaces were affected more often than female surfaces, especially in the upper cervical spine. While osteoarthritis is noted by 25-30 years of age in the articular facets, osteoarthritis of the end-plates is not prevalent until 40-45 years. There is an increase in osteoarthritis of male cervical vertebrae over time, particularly in the upper cervical segments, but no significant changes in the prevalence in female vertebrae. When the sexes are combined, and age is controlled, there is a significant decrease in osteoarthritis of the cervical facets, and an increase in middle and old aged vertebrae.

Thoracic Vertebral Osteoarthritis

Observations of the articular facets and end-plates of the 12 thoracic vertebrae (T1-12) in 62 adults from Non Nok Tha are summarized in Table B.36. The posterior articular facets are commonly arthritic (43.5%, 525/1206), with the predominant observation of lipping (97.3%, 511/525) in the affected facets. Advanced observations (moderate and marked) are rare (20/525, 3.8%), and are more common in male facets (18/355, 5.1%) than female facets (2/170, 1.2%). Overall, the most commonly involved facets are from the T10-11 interface (62/106, 58.5%).

The thoracic vertebral end-plates are less commonly affected by osteoarthritis (19.5%, 139/713). Porosis of the end-plate is the most common observation in affected bodies (50.3%, 70/139). The prevalence of osteoarthritic changes in the vertebral end-plates is fairly consistent over the thoracic spine, with slightly more changes at the T4-5 and T11-12 interfaces.

Combining all kinds of osteoarthritic changes, and comparing sex frequencies by level, there is more osteoarthritis in the male articular surfaces than in female surfaces (Table 5.113). A difference which is statistically significant in the summed posterior thoracic facets (49.8% : 34.5%), and at various levels of the spine (bold cells). In males, the T10-11 interface has the most osteoarthritic changes (62.1%) followed by the upper levels (T2-3 55.4%, T1-2 54.2%). In females, the greatest prevalence of osteoarthritis of the facets occurs in the lower thoracic spine, T10-11 (54.2%) and T11-12 (45.7%).

Observations of the thoracic vertebral end-plates are smaller in number than those of the facets, and osteoarthritis is less common. There is near equality in the prevalence of osteoarthritis of the end-plates in male and female vertebrae from Non Nok Tha. There is little uniformity in progression down the thoracic spine, rather, osteoarthritis seems to be most prevalent at the upper and lower levels, in both sexes. Although vertebral end-plate osteoarthritis is more common in males (21.0%, 87/414) than females (17.4%, 52/299), the difference is not statistically significant.

Table 5.113. Prevalence of Thoracic Vertebral Osteoarthritis, By Sex, in Non Nok Tha Adults

THORACIC Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
FACETS						
T1-2	39/72	54.2	10/43	23.3	**χ^2=10.519**	**0.001**
T2-3	31/56	55.4	6/42	14.3	**χ^2=17.227**	**0.000**
T3-4	28/63	44.4	11/30	36.7	χ^2=0.505	0.477
T4-5	32/69	46.4	19/50	38.0	χ^2=0.831	0.362
T5-6	29/68	42.6	19/48	39.6	χ^2=0.109	0.741
T6-7	32/69	46.4	15/49	30.6	**χ^2=2.971**	**0.085**
T7-8	34/75	45.3	13/48	27.1	**χ^2=4.129**	**0.042**
T8-9	36/68	52.9	9/41	22.0	**χ^2=10.134**	**0.001**
T9-10	35/69	50.7	21/48	43.8	χ^2=0.552	0.458
T10-11	36/58	62.1	26/48	54.2	χ^2=0.676	0.411
T11-12	23/46	50.0	21/46	45.7	χ^2=0.174	0.676
Total	355/713	49.8	170/493	34.5	**χ^2=27.781**	**0.000**
END-PLATES						
T1-2	2/27	7.4	5/25	20.0	FET	0.241
T2-3	5/31	16.1	3/24	12.5	FET	1.000
T3-4	9/37	24.3	4/20	20.0	FET	1.000
T4-5	12/36	33.3	5/23	21.7	χ^2=0.920	0.338
T5-6	9/39	23.1	2/22	9.1	FET	0.299
T6-7	7/36	19.4	2/32	9.1	FET	0.459
T7-8	4/37	10.8	3/22	13.6	FET	1.000
T8-9	7/35	20.0	5/24	20.8	FET	1.000
T9-10	10/39	25.6	6/29	20.7	χ^2=0.227	0.634
T10-1i	10/37	27.0	6/30	20.0	χ^2=0.450	0.502
T11-12	9/31	29.0	6/28	21.4	χ^2=0.449	0.503
T12-L1	3/29	10.3	5/30	16.7	FET	0.706
Total	87/414	21.0	52/299	17.4	χ^2=1.452	0.228

Note: All types and degrees of osteoarthritis, A=affected, O=observed, T=thoracic, L=lumbar, FET=Fisher's Exact Test (two-tailed probability). Includes 62 individuals: 33 males and 29 females. **Bold** indicates statistical significance (α=0.10).

The increased prevalence of osteoarthritis in the male thoracic articular facets and end-plates may be related to the age-at-death distribution of the sample (Table 5.114). The Non Nok Tha thoracic vertebral sample has more young adult females than males, and more old-aged males than females. Examining osteoarthritis prevalence by age interval (note that this is a sub-sample), slight osteoarthritis of the articular facets is present in early young adulthood in females, and reaches 40.7% by age 30-35 in males. Advanced observations have a fairly consistent prevalence after age 35 years. In the thoracic end-plates, osteoarthritis is not observed until age 35-40 years in males and 40-45 years in females.

Table 5.114. Thoracic Vertebral Osteoarthritis By Age and Sex in Non Nok Tha Adults

THORACIC Articulations % Affected/Observed	Age Interval (in years)								Total
	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
FACETS									
Male # Individuals	1	2	2	11	4	5	0	9	34
# Facets	5	67	59	259	109	78		130	707
Slight			40.7	40.5	54.1	67.9		73.1	47.5
Advanced				2.3	2.8	3.8		4.6	25.5
Female # Individuals	4	5	1	6	7	1	3	5	32
# Facets	54	123	6	90	110	22	17	34	456
Slight	1.9	25.2		35.6	64.5	4.5	23.5	47.1	34.2
Advanced					1.8				0.4
END-PLATES									
Male # End-plates	20	28	38	139	54	57		78	414
Slight				16.5	5.6	54.4		38.5	21.0
Female # End-plates	54	65	12	32	90	6	10	23	292
Slight					35.6		70.0	52.2	17.5

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 34 males, 32 females.

Temporal Change in Thoracic Osteoarthritis

Initial examination of temporal change in the prevalence of thoracic osteoarthritis requires assessment of possible sex differences in temporal change (Table 5.115). The prevalence of osteoarthritis of all thoracic articular facets is slightly greater in the Late Group males (48.8% : 50.6%). When the thoracic spine is examined by level, however, there are inconsistent trends - osteoarthritis increases over time at some levels and decreases at other levels. In the female thoracic articular facets, there are few statistically significant differences, and the overall prevalence is nearly identical in each group (35.7% : 33.3%). Again, there is inconsistency across the thoracic spine, with increases and decreases at various levels.

Sample sizes of observations of the thoracic vertebral bodies are quite small, but there is an apparent trend toward increased osteoarthritis in both males and females in the Late Group at Non Nok Tha. In the males, there is a consistent increase in osteoarthritis in the upper level of the spine, and a fairly consistent decrease in osteoarthritis in the lower levels. The greatest prevalence of osteoarthritis of the articular facets shifts from T9-11 in the Early Group, to the mid-levels T3-7 in the Late Group. In the female thoracic end-plate sample, there is a slight increase in osteoarthritis in the Late Group (16.8% : 18.2%), a difference which does not reach statistical significance, and there are few significantly different values at each level. The greatest prevalence of osteoarthritis in the Early Group females occurs in the lower elements, while in the Late Group the greatest prevalence occurs in the T3-5 region. Again, caution must be exercised because of the small sample sizes in these Non Nok Tha Group sub-samples.

Table 5.115. Thoracic Osteoarthritis, By Sex and Group, in Non Nok Tha Adults

THORACIC Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
FACETS												
T1-2	17/35	48.6	22/37	59.5	χ^2=0.859	0.354	2/18	11.1	8/25	32.0	FET	0.153
T2-3	17/25	68.0	14/31	45.2	**χ^2=2.921**	**0.087**	4/23	17.4	2/19	10.5	FET	0.673
T3-4	9/27	33.3	19/36	52.8	χ^2=2.363	0.124	6/16	37.5	5/14	35.7	χ^2=0.010	0.919
T4-5	14/30	46.7	18/39	46.2	χ^2=0.002	0.966	8/25	32.0	11/25	44.0	χ^2=0.764	0.382
T5-6	9/29	31.0	20/39	51.3	**χ^2=2.788**	**0.095**	10/26	38.5	9/22	40.9	χ^2=0.030	0.863
T6-7	8/32	25.0	24/37	64.9	**χ^2=10.97**	**0.001**	6/20	30.0	9/29	30.0	χ^2=0.006	0.938
T7-8	18/35	51.4	16/40	40.0	χ^2=0.984	0.321	10/26	38.5	3/22	13.6	**χ^2=3.719**	**0.054**
T8-9	23/33	69.7	13/35	37.1	**χ^2=7.225**	**0.007**	3/18	16.7	6/23	26.1	FET	0.706
T9-10	15/31	48.4	20/38	52.6	χ^2=0.123	0.726	8/24	33.3	13/24	54.2	χ^2=2.116	0.146
T10-11	17/26	65.4	19/32	59.4	χ^2=0.220	0.639	15/24	62.5	11/24	45.8	χ^2=1.343	0.247
T11-12	12/23	52.2	11/23	47.8	χ^2=0.087	0.768	14/21	66.7	7/25	28.0	**χ^2=6.878**	**0.009**
Total	159/326	48.8	196/387	50.6	χ^2=0.248	0.618	86/241	35.7	84/252	33.3	χ^2=0.301	0.583

Table 5.115 (cont'd.). Thoracic Osteoarthritis, By Sex and Group, in Non Nok Tha Adults

THORACIC Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
END-PLATES												
T1-2	1/15	6.7	1/12	8.3	FET	1.000	2/13	15.4	3/12	25.0	FET	0.645
T2-3	1/17	5.9	4/14	28.6	FET	0.148	2/16	12.5	1/8	12.5	FET	1.000
T3-4	0/19	0.0	9/18	50.0	**FET**	**0.003**	1/14	7.1	3/6	50.0	**FET**	**0.061**
T4-5	3/20	15.0	9/16	56.3	**χ^2=6.806**	**0.009**	2/16	12.5	3/7	42.9	FET	0.142
T5-6	3/23	13.0	6/16	37.5	FET	0.123	1/13	7.7	1/9	11.1	FET	1.000
T6-7	2/23	8.7	5/13	38.5	**FET**	**0.073**	2/13	15.4	0/9	0.0	FET	0.494
T7-8	1/20	5.0	3/17	17.6	FET	0.315	2/13	15.4	1/9	11.1	FET	1.000
T8-9	4/17	23.5	3/18	16.7	FET	0.691	3/11	27.3	2/13	15.4	FET	0.630
T9-10	6/20	30.0	4/19	21.1	FET	0.716	3/13	23.1	3/16	18.8	FET	1.000
T10-11	6/18	33.3	4/19	21.1	FET	0.476	3/15	20.0	3/15	20.0	FET	1.000
T11-12	4/16	25.0	5/15	33.3	FET	0.704	4/15	26.7	2/13	15.4	FET	0.655
T12-L1	1/17	5.9	2/12	16.7	FET	0.553	3/15	20.0	2/15	13.3	FET	1.000
Total	32/225	14.2	55/189	29.1	**χ^2=13.70**	**0.000**	28/167	16.8	24/132	18.2	χ^2=0.103	0.748

Note: FET=Fisher's Exact Test (two-tailed probabilities), A=affected, O=observed. Includes 62 individuals: 33 males, 39 females. **Bold** indicates statistical significance (α=0.10).

Collapsing the sexes and examining group differences in the prevalence of thoracic vertebral osteoarthritis by controlling for general age intervals (Table 5.116), the relative increase in osteoarthritis in the Late Group is contrasted depending upon the age category. Thoracic articular facet osteoarthritis decreases in young adults, increases in middle-aged adults and decreases in the old adults. Thoracic end-plate osteoarthritis also shows an increase over time in both the middle-age and old age sample.

Table 5.116. Thoracic Vertebral Osteoarthritis, Controlling for Age, in Non Nok Tha Adults

THORACIC Articulations Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
Thoracic Facets						
Young adult	38/157	24.2	18/157	11.5	**χ^2=8.693**	**0.003**
Middle-aged adult	126/301	41.9	209/367	56.9	**χ^2=15.06**	**0.000**
Old-aged adult	80/97	82.5	41/84	48.8	**χ^2=23.02**	**0.000**
Thoracic End-plates						
Young adult	0/134	0.0	0/83	0.0		
Middle-aged adult	33/193	17.1	56/185	30.3	**χ^2=9.104**	**0.003**
Old-aged adult	27/64	42.2	22/47	46.8	χ^2=0.235	0.628

Note: A=affected, O=observed, young adult is 15-35 years, middle adult is 35-50 years and old is 50+ years. Includes only individuals with age-interval estimates: 66 individuals: 34 males, 32 females. **Bold** indicates statistical significance (α=0.10).

Summary of Thoracic Vertebral Osteoarthritis

Osteoarthritic changes are noted in 43.5% of the thoracic articular facets and in 19.5% of the thoracic vertebral end-plates examined in the Non Nok Tha adults. Articular lipping was the most common change found in the articular facets, while porosis was most common in the vertebral bodies. Osteoarthritis in the thoracic spine is more frequent in male surfaces, with the greatest prevalence in both sexes at T10-11. Articular changes in the thoracic spine are not noted until age 35-40 years in Non Nok Tha males, and are noted slightly later in age in females (40-45 years). There is no consistent trend in osteoarthritis over time in this region of the spine; some levels there is an increase and at some levels a decrease. When the sexes are combined and age is controlled, there is a general increase in osteoarthritis of the articular facets in the young and middle-aged adults, and a decrease in the old-aged population. In the thoracic end-plate osteoarthritis there is also an increase in the middle and old-aged categories.

Rib Facet Osteoarthritis

Rib facet osteoarthritis, scored at two sites on each rib (head and tubercle) and two sites on each vertebrae (right and left), is summarized in Non Nok Tha adults in Table B.37. Osteoarthritis of the rib facets is not common in the Non Nok Tha skeletal remains, occurring in 38.1% of all rib facets observed (424/1114). Lipping of the articular surface was the most common degenerative change observed, noted in 97.9% of the affected facets (415/424), with few observations of porosis or a combination of lipping and porosis. Advanced observations (moderate and marked) occur in only 1.9% (8/424) of all affected facets.

Table 5.117. Prevalence of Rib Facet Osteoarthritis, By Sex, in Non Nok Tha Adults

Rib Number Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	Test	Probability
One	13/51	25.5	5/40	12.5	$\chi 2$=2.384	0.123
Two	21/51	41.2	4/14	23.5	$\chi 2$=1.708	0.191
Three	22/62	35.5	10/33	30.3	$\chi 2$=0.259	0.611
Four	28/64	43.8	12/45	26.7	**$\chi 2$=3.319**	**0.068**
Five	36/86	41.9	13/47	27.7	$\chi 2$=2.634	0.105
Six	32/72	44.4	15/46	32.6	$\chi 2$=1.641	0.200
Seven	40/77	51.9	13/36	36.1	$\chi 2$=2.471	0.116
Eight	32/70	45.7	6/24	25.0	**$\chi 2$=3.184**	**0.074**
Nine	28/67	41.8	4/27	14.8	**$\chi 2$=6.237**	**0.013**
Ten	28/59	47.5	9/22	40.9	$\chi 2$=0.277	0.599
Eleven	16/39	41.0	9/28	32.1	$\chi 2$=0.550	0.458
Twelve	21/31	67.7	7/20	35.0	**$\chi 2$=5.264**	**0.022**
Total	317/729	43.5	107/385	27.8	**$\chi 2$=26.316**	**0.000**

Note: All types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability). Includes 71 individuals: 37 males and 34 females. **Bold** indicates statistical significance (α=0.10).

Examining the rib facets by level for sex differences, Table 5.117, it is evident that there is more osteoarthritis in male facets (43.5%, 317/729) than female facets (27.8%, 107/385). The difference reaches statistical significance in the summed facets, as well as the fourth, eighth, ninth and twelfth ribs. Again, any conclusions regarding the distribution of osteoarthritis in the rib cage must be made with caution because of the difficulties in assigning fragmentary ribs to a specific level, other than the upper and lower regions.

Utilizing the sub-sample of Non Nok Tha adults with specific age-interval estimates, an examination of the age distribution of rib facet osteoarthritis can be made (Table 5.118). There is apparently a fair distribution of individuals over the age intervals, although males are slightly under-represented in the younger intervals. Slight rib facet osteoarthritis is present in

Table 5.118. Rib Facet Osteoarthritis By Age and Sex in Non Nok Tha Adults

Sex % Rib Facets Affected		Age Interval (in years)								Total
		20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Male	# Individuals	1	2	3	12	5	6	0	10	39
	# Facets	11	84	39	256	116	82		119	707
	Slight	9.1	0.0	10.3	49.6	25.0	89.0		57.1	42.7
	Advanced				0.8				5.0	1.1
Female	# Individuals	4	5	1	7	8	0	3	5	33
	# Facets	66	115	4	43	102	0	5	40	375
	Slight	4.6	8.7	0.0	41.9	48.0		60.0	57.5	28.3

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 36 males, 30 females.

Table 5.119. Rib Facet Osteoarthritis, By Sex and Group, in Non Nok Tha Adults

Rib Number Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	*p*	A/O	%	A/O	%	Test	*p*
One	8/25	32.0	5/26	19.2	1.094	0.296	3/16	18.8	2/24	8.3	FET	0.373
Two	**14/26**	**53.8**	**7/25**	**28.0**	**3.515**	**0.061**	4/12	33.3	0/5	0.0	FET	0.261
Three	10/26	38.5	12/36	33.3	0.173	0.677	7/21	33.3	3/12	25.0	FET	0.710
Four	**20/32**	**62.5**	**8/32**	**25.0**	**9.143**	**0.002**	6/23	26.1	6/22	27.3	0.008	0.928
Five-Ten	77/172	44.8	106/244	43.4	0.072	0.789	32/108	29.6	25/82	30.5	0.016	0.898
Eleven	6/17	35.3	10/22	45.5	0.409	0.522	7/19	36.8	2/9	22.2	FET	0.670
Twelve	12/17	70.6	9/14	64.3	FET	1.000	3/10	30.0	4/10	40.0	FET	1.000
All Ribs	**160/330**	**48.5**	**157/399**	**39.3**	**6.135**	**0.013**	63/213	29.6	44/172	25.6	0.757	0.384

Note: FET=Fisher's Exact Test (two-tailed probabilities), A=affected, O=observed. Includes 71 individuals: 37 males, 34 females. **Bold** indicates statistical significance (α=0.10).

the male sample from the earliest age intervals, although a high frequency is not reached until 35-40 years. A similar peak in prevalence is seen in females. Advanced observations, noted only in males, are too rare to exhibit any trends.

Temporal Trends in Rib Facet Osteoarthritis

Examining the Non Nok Tha Group sub-samples for evidence of group differences by sex (Table 5.119) documents a decrease in rib facet osteoarthritis in both males and females in the Late Group. There are no statistically significant differences in the female samples. In the male samples, there is a statistically significant decrease in osteoarthritis in the second and fourth ribs facets in the Late Group, as well as a significant decrease in osteoarthritis of all of the rib facets over time (Early 48.5% : Late 39.3%). Of course, this distribution is highly dependent upon the age structure of the various samples.

Table 5.120. Prevalence of Rib Facet Osteoarthritis, By Group, in Non Nok Tha Adults

Rib Number Osteoarthritis Present	Early		Late		Statistic	
	A/O	%	A/0	%	χ^2 Value	Probability
One	11/41	26.8	7/50	14.0	0.337	0.126
Two	18/38	47.4	7/30	23.3	**4.166**	**0.041**
Three	17/47	36.2	15/48	31.3	0.257	0.612
Four	26/55	47.3	14/54	25.9	**5.345**	**0.021**
Five-Ten	109/280	38.9	131/326	40.2	0.099	0.753
Eleven	13/36	36.1	12/31	38.7	0.048	0.826
Twelve	15/27	55.6	13/24	54.2	0.010	0.921
All Ribs	223/543	41.1	201/571	35.2	**4.063**	**0.044**

Note: All types and degrees of osteoarthritis, A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probability). Includes 71 individuals: 37 males and 34 females. **Bold** indicates statistical significance (α=0.10).

When the sexes are combined, and temporal trends examined (Table 5.120), the statistically significant decrease in osteoarthritis of the second and fourth rib facets is retained. As well, the combined rib facets show a statistically significant decline in osteoarthritis in the Late Group at Non Nok Tha.

Controlling for age in the group samples from Non Nok Tha, Table 5.121, there is a decline in osteoarthritis in the Late Group in the young adult and old aged categories, and an increase in osteoarthritis in the middle-aged individuals. The only statistically significant change is a decrease in the Late Group old-aged individuals at Non Nok Tha (bold cell).

Table 5.121. Rib Facet Osteoarthritis By Group, Controlling for Age, in Non Nok Tha Adults

All Rib Facets Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	χ^2 Value	*p*
Young adult	10/145	6.9	8/174	4.6	0.785	0.376
Middle-aged adult	145/299	48.5	153/300	51.0	0.376	0.540
Old-aged adult	61/77	79.2	39/87	44.8	**20.306**	**0.000**

Note: A=affected, O=observed, young is 15-35 years, middle is 35-50 years and old is 50+ years. Includes only individuals with an age-interval estimate: 66 individuals 36 males, 30 females. **Bold** indicates statistical significance (α=0.10).

Summary of Rib Facet Osteoarthritis

Degenerative changes of the rib facets are present in 43.5% of male facets and 27.8% of female facets. The prevalence is fairly uniform across the thoracic skeleton, with the greatest prevalence in males in the twelfth rib, and the tenth in females. Osteoarthritis is present in the earliest adult age intervals, but does not reach a high prevalence until 35-40 years in both sexes. There is no consistency in temporal changes through the rib cage, but a general trend toward declining prevalence is present in both males (48.5% : 39.3%) and females (29.6% : 25.6%), and in the combined sample (41.1% : 35.2%).

Lumbar Vertebral Osteoarthritis

Osteoarthritis recorded in the lumbar and first sacral vertebrae (L1-S1) of 61 adults from Non Nok Tha is summarized in Table B.38. Nearly three-quarters of the posterior articular facets are affected with osteoarthritis (71.1%, 482/678), with lipping as the most common change (99.2%, 478/482). Advanced observations (moderate and marked) are uncommon (3.2%, 15/478) and are noted primarily in males (14/356, 3.9%). In males, the L3-4 interface is most often affected with osteoarthritis (53/67, 79.1%), while in females, the L1-2 interface (82.7%, 43/52). The advanced observations are noted in the lower levels of the lumbar spine.

In the lumbar centra, osteoarthritis is noted in 34.6% of the end-plates observed (113/327). In males, lipping is the most common alteration (23/55, 41.8%), while in females, porosis is the most common finding (32/58, 55.2%). Advanced observations are, again, more common in male affected end-plates (18/55, 32.7%) than in female affected end-plates (8/58, 13.8%). Osteoarthritis in males occurs fairly uniformly across the lumbar spine, ranging from 30% to 40% of the observed end-plates, with the highest frequency at the L2-3 interface (40.0%). In females, there is a greater range across the lumbar spine (24% - 42%), with the greatest prevalence at the L4-5 interface.

Collapsing the types and degrees of osteoarthritis observed in Non Nok Tha adults, and comparing the prevalence by level and sex (Table 5.122) documents a greater prevalence in males at a majority of levels. Lumbar articular facet osteoarthritis is greater in males overall, and statistically significant differences are noted in the upper two interfaces (T12-L1, L1-2). In the vertebral end-plate sample, there are no sex differences which reach statistical significance.

Table 5.122. Prevalence of Lumbar Vertebral Osteoarthritis, By Sex, in Non Nok Tha Adults

LUMBAR Articulations Osteoarthritis Present	Male		Female		Statistic	
	A/O	%	A/0	%	χ^2 Value	Probability
FACETS						
T12-L1	48/62	77.4	27/47	57.4	**4.969**	**0.026**
L1-2	42/61	68.9	43/52	82.7	**2.885**	**0.089**
L2-3	47/66	71.2	39/56	69.6	0.036	0.850
L3-4	53/67	79.1	44/62	71.0	1.143	0.285
L4-5	41/55	74.5	39/58	67.2	0.728	0.393
L5-S1	32/45	71.1	27/47	57.4	1.866	0.172
Total	263/356	73.9	219/322	68.0	**2.829**	**0.093**
END-PLATES						
L1-2	10/29	34.5	7/29	24.1	0.749	0.387
L2-3	12/30	40.0	10/32	31.3	0.518	0.472
L3-4	11/32	34.4	13/34	38.2	0.106	0.745
L4-5	11/36	30.6	15/36	41.7	0.963	0.326
L5-S1	11/32	34.4	13/37	35.1	0.004	0.947
Total	55/159	34.6	58/168	34.5	0.000	0.990

Note: All types and degrees of osteoarthritis, A=affected, O=observed, T=thoracic, L=lumbar, FET=Fisher's Exact Test (two-tailed probability). Includes 61 individuals: 30 males and 31 females. **Bold** indicates statistical significance (α=0.10).

The age distribution of the slight and advanced observations of osteoarthritis of the lumbar spine, by sex is summarized in Table 5.123. Slight osteoarthritis is present in the lumbar articular facets from the earliest adult age intervals, but advanced observations are not seen until 35-40 years with an increasing frequency in the later age intervals. In the vertebral end-plates, osteoarthritis is fairly uncommon in the early adult age intervals, affecting approximately one-fourth of the end-plates in both sexes by the age of 35-40. Advanced observations are noted earlier in males (30-35 years) than females (35-40 years).

Table 5.123. Lumbar Vertebral Osteoarthritis By Age and Sex in Non Nok Tha Adults

LUMBAR Articulations % Affected/Observed		Age Interval (in years)								Total
		20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
FACETS										
Male	# Individuals	1	2	3	13	5	7	0	10	41
	# Facets	1	30	34	102	76	70		43	356
	Slight		10.0	58.8	93.1	65.8	57.1		95.4	69.9
	Advanced				3.9		12.8		2.3	3.9
Female	# Individuals	5	5	1	8	9	1	3	5	37
	# Facets	42	80	10	50	72	1	14	46	315
	Slight	33.3	33.8	50.0	92.0	90.3	0.0	92.9	93.5	67.6
	Advanced								2.2	0.3
END-PLATES										
Male	# End-plates	9	15	20	42	31	23		19	159
	Slight			5.0	26.2	16.1	60.9		31.6	23.3
	Advanced				2.4	6.5	4.3		68.4	11.3
Female	# End-plates	22	37	6	25	41	0	6	28	165
	Slight	4.5	10.8		28.0	58.5		33.3	35.7	29.1
	Advanced					2.4		66.7	7.1	4.2

Note: A=affected, O=observed, #=number. Only individuals with specific (5 year interval) age estimates are included here: 30 males, 28 females.

Temporal Changes in Lumbar Osteoarthritis

The prevalence of osteoarthritis of the posterior articular facets of the lumbar vertebrae increases slightly in Late Group female vertebrae (72.1% : 64.3%) and is unchanged in male vertebrae (72.0% : 76.3%) [Table 5.124]. In female articular facets, the major increase in osteoarthritis of the facets occurs in the lower lumbar interfaces (L4-S1), while in males, none of the temporal changes is statistically significant.

Osteoarthritis of the vertebral end-plates shows a slight decrease in females (39.4% : 28.4%) and a slight increase in males (30.3% : 40.0%), but neither is statistically significant. In males, there is an apparent shift in osteoarthritis prevalence from the L5-S1 interface upward to the L1-2 and L2-3 interfaces.

Table 5.124. Lumbar Vertebral Osteoarthritis, By Sex and Group, in Non Nok Tha Adults

LUMBAR Osteoarthritis Present	Male						Female					
	Early		Late		Statistic		Early		Late		Statistic	
	A/O	%	A/O	%	Test	p	A/O	%	A/O	%	Test	p
FACETS												
T12-L1	26/31	83.9	22/31	71.0	χ^2=1.476	0.224	17/26	65.4	10/21	47.6	χ^2=1.500	0.221
L1-2	20/27	74.1	22/34	64.7	χ^2=0.616	0.433	26/30	86.7	17/22	77.3	FET	0.468
L2-3	19/27	70.4	28/39	71.8	χ^2=0.016	0.900	17/26	65.4	22/30	73.3	χ^2=0.416	0.519
L3-4	19/26	73.1	34/41	82.9	χ^2=0.934	0.334	20/29	69.0	24/33	72.7	χ^2=0.106	0.745
L4-5	19/24	79.2	22/31	71.0	χ^2=0.479	0.489	15/28	53.6	24/30	80.0	**χ^2=4.592**	**0.032**
L5-S1	16/21	76.2	16/24	66.7	χ^2=0.495	0.482	13/29	44.8	14/18	77.8	**χ^2=4.933**	**0.026**
Total	119/156	76.3	144/200	72.0	χ^2=0.833	0.362	108/168	64.3	111/154	72.1	χ^2=2.242	0.134
END-PLATES												
L1-2	4/17	23.5	6/12	50.0	FET	0.236	5/16	31.3	2/13	15.4	FET	0.410
L2-3	5/17	29.4	7/13	53.9	χ^2=1.833	0.176	7/19	30.8	3/13	23.1	FET	0.467
L3-4	6/19	31.6	5/13	38.5	FET	0.721	8/17	47.1	5/17	29.4	χ^2=1.121	0.290
L4-5	5/19	26.3	6/17	35.3	χ^2=0.341	0.559	9/19	47.4	6/17	35.3	χ^2=0.538	0.463
L5-S1	7/17	41.2	4/15	26.7	χ^2=0.744	0.388	8/23	34.8	5/14	35.7	FET	1.000
Total	27/89	30.3	28/70	40.0	χ^2=1.617	0.204	37/94	39.4	21/74	28.4	χ^2=2.210	0.137

Note: A=affected, O=observed, T=thoracic, L=lumbar, S=sacral, FET=Fisher's Exact Test (two-tailed probabilities). Includes 61 individuals: 30 males, 31 females. **Bold** indicates statistical significance (α=0.10).

The absence of a clear temporal trend in osteoarthritis of the lumbar spine is supported when the sexes are combined, and osteoarthritis is examined controlling for general age categories (Table 5.125). There is very little change in the prevalence of osteoarthritis of the articular facets, and the only statistically significant change in vertebral end-plate osteoarthritis occurs in the old-aged category, a difference which may be the result of sampling error.

Table 5.125. Lumbar Vertebral Osteoarthritis, Controlling for Age, in Non Nok Tha Adults

LUMBAR Age Category	Early Group		Late Group		Statistic	
	A/O	%	A/O	%	Test	*p*
Lumbar Facets						
Young	37/103	35.9	32/94	34.0	χ^2=0.076	0.782
Middle-aged	132/160	82.5	177/209	84.7	χ^2=0.319	0.572
Old-aged	57/59	96.6	42/43	97.7	FET	1.000
Lumbar End-plates						
Young	2/63	3.2	5/46	10.9	FET	0.130
Middle-aged	32/82	39.0	34/80	42.5	χ^2=0.023	0.653
Old-aged	29/37	78.4	8/16	50.0	**FET**	**0.054**

Note: A=affected, O=observed, young adult is 15-35 years, middle adult is 35-50 years and old is 50+ years. Includes only individuals with age-interval estimates: 58 individuals: 30 males, 28 females. **Bold** indicates statistical significance (α=0.10).

Summary of Lumbar Osteoarthritis

Seventy-one percent of the lumbar articular facets have osteoarthritis in Non Nok Tha adults, in males, the greatest prevalence occurs at the L3-4 junction, while in females the greatest is at L1-2. In the lumbar end-plates, 34.6% are affected with osteoarthritic lipping or porosis or both, with the greatest prevalence at L2-3 in males and L4-5 in females. Slight articular changes in both end-plates and facets are noted in early adults, and advanced changes are noted by age 30 in males and 35 in females, reflecting the increased stress on the lower spine. There are no statistically significant temporal changes in male osteoarthritis of the lumbar spine, and in females there is an increase in osteoarthritis of the lower lumbar facets. When the sexes are combined and age is controlled, the only statistically significant temporal change is a decrease in the prevalence of osteoarthritis of the end-plates in old aged adults.

Summary of Axial Osteoarthritis

Except in the temporo-mandibular joint, adult males have a higher prevalence of osteoarthritis than adult females at Non Nok Tha (Table 5.126). In both sexes, the highest frequency of osteoarthritis occurs in the occiput-C1 and the lumbar vertebral facets, reflecting the areas of greatest motion in the spinal column. Generally, there is more osteoarthritis in the posterior articular facets than in the vertebral end-plates.

Table 5.126. Summary of Axial Skeleton Osteoarthritis in Non Nok Tha Adults

Sex Articular Facets		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
TMJ		3/97	3.1	3/67	4.5	6/164	3.7
Occipital-C1		70/87	80.5	29/51	56.9	99/138	71.8
C1-2		46/85	54.1	21/55	38.2	67/140	47.9
Dens		12/36	33.3	2/20	10.0	14/56	25.0
Cervical	Facets	128/386	33.2	40/249	16.1	168/633	26.5
	End-plates	38/221	17.2	11/131	8.4	49/352	13.9
Thoracic	Facets	355/713	49.8	170/493	34.5	525/1206	43.5
	End-plates	87/414	21.0	52/299	17.4	139/713	19.5
Ribs		317/729	43.5	107/385	27.8	424/1114	38.1
Lumbar	Facets	263/356	73.9	219/322	68.0	482/678	71.1
	End-plates	55/159	34.6	58/168	34.5	113/327	34.6

Note: A=affected, O=observed, TMJ=temporo-mandibular joint, C=cervical.

Osteoarthritis of the articular facets of the vertebral column is fairly uniformly distributed down the spine, with the greatest prevalence in the upper cervical and lower lumbar elements, in both sexes. The prevalence of porosis and lipping osteoarthritis of the vertebral end-plates, by level and sex, is illustrated in Figures 5.27 and 5.28. Observations of combination of porosis and lipping are included in both the figures. Porosis is more common in female vertebral end-plates than in male end-plates, exhibiting a high prevalence in the lower cervical-upper thoracic region, followed by a steadily increasing prevalence in the lower thoracic (T7-12) and lumbar elements. In males, the prevalence of end-plate porosis is less consistent across the spine, with peaks at C3-4, T9-10 and L3-4 interfaces.

Osteophytosis or lipping of the vertebral end-plates is more common in male vertebrae than female (Figure 5.28). The distributions are tri-phasic, with peaks in the lower cervical, upper thoracic and lower lumbar vertebrae. In males, there is more osteophytosis of the upper lumbar (L1-3) vertebrae than in females where the peak is in the lower lumbar (L3-5).

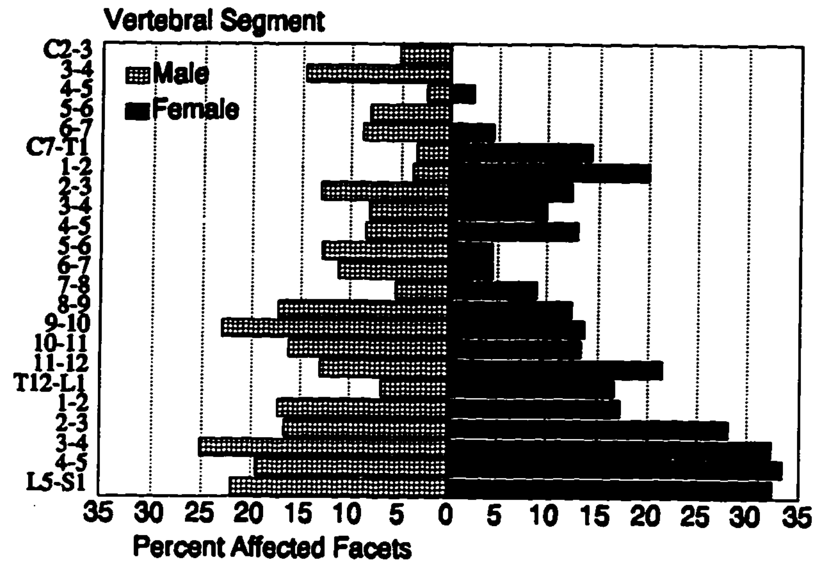


Figure 5.27. Vertebral Centrum Osteoporosis

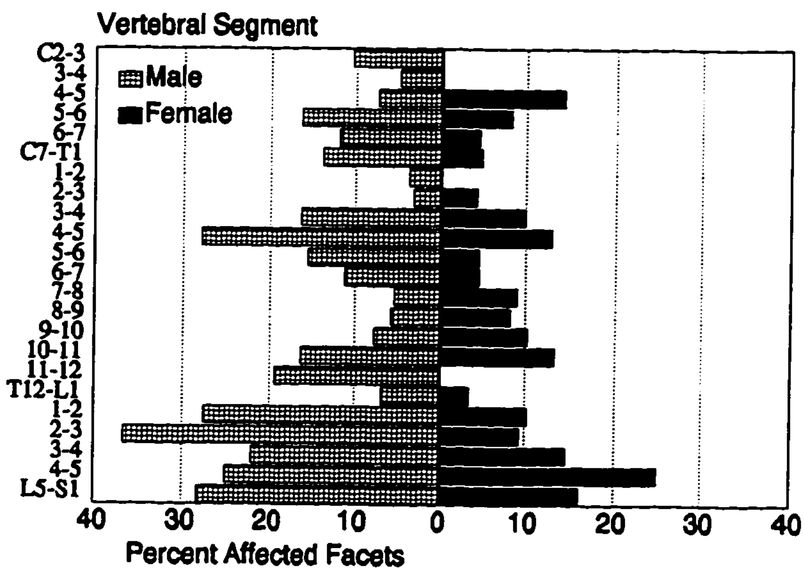


Figure 5.28. Vertebral Centrum Osteophytosis

Examination of the temporal changes in osteoarthritis of the axial skeleton at Non Nok Tha, demonstrates a general trend toward increased osteoarthritis in the Late Group. There are no statistically significant differences in the prevalence of osteoarthritis of the TMJ over time in either sex. In the occipital-cervical complex of articulations, there is a trend toward decreasing osteoarthritis in the male occiput-C1, C1-2; increasing osteoarthritis in the females at these sites, and a decrease in osteoarthritis at the dens in both sexes. The latter distinction is the only statistically significant difference when the sexes are combined in the occipital-cervical complex.

In the remaining vertebral elements, there are inconsistent temporal trends at each level of the spine, so discussion will focus on the summed observations (Figures 5.29 and 5.30). As expected, the prevalence of osteoarthritis of the posterior articular facets of the spine increases from the cervical to the lumbar segments. In males, there is an increase in affected cervical and thoracic facets, but a slight decline in the lumbar facets affected over time. In female facets, there is little change in the cervical and thoracic osteoarthritis, but an increase in the affected lumbar facets in the Late Group.

The vertebral end-plates also exhibit an increase in osteoarthritis prevalence from the cervical to the lumbar spine. In the male end-plates observed there is an increase in osteoarthritis in all three segments of the spine, while in females, there is a slight increase in the cervical and thoracic osteoarthritis, but a decline in osteoarthritis of the lumbar spine.

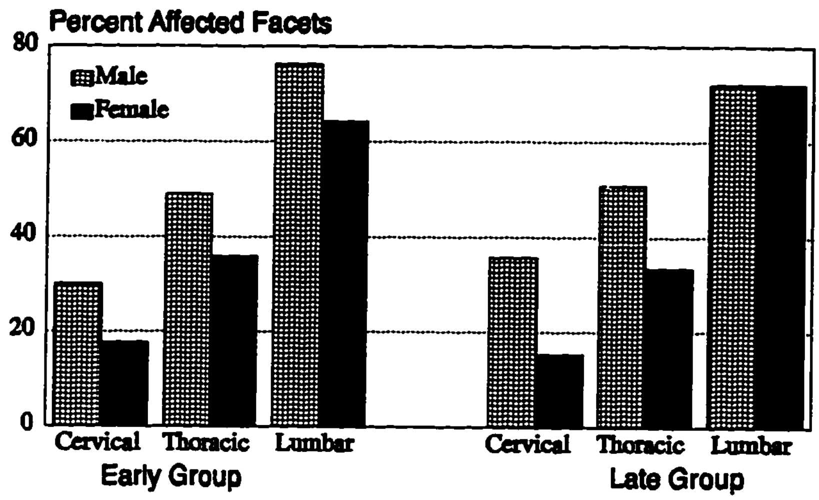


Table 5.29. Articular Facet Osteoarthritis Over Time

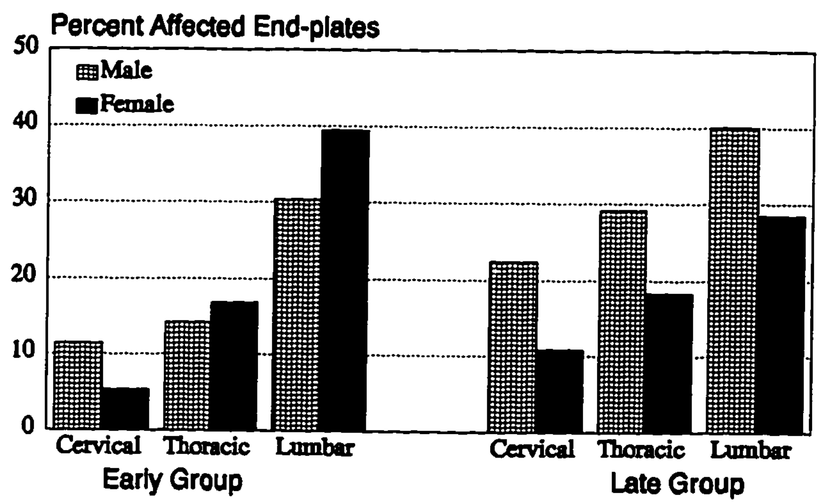


Figure 5.30. Vertebral End-plate Osteoarthritis Over Time

TRAUMA

Fifteen adults, seven females and eight males, from Non Nok Tha have evidence of possible traumatic injury (Table 5.127). Detailed descriptions of these pathologies may be found in the Burial Descriptions (Appendix C). No evidence of traumatic injury is found in the subadults from Non Nok Tha. The majority of these adults have trauma to one element of the skeleton, but there are four adults with trauma to two elements (two females, two males). The most common element affected in these cases is the clavicle (3 individuals), but at least one, and possibly two of these, are equivocal. Also affected in two individuals each are the ribs, lower lumbar vertebrae, the tibia, hand bones and upper cervical vertebrae.

There is no evidence of infection as a complication of any of these fractures. Except in the instances of spondylolysis, and one non-united midshaft clavicle fracture, all of the fractures have healed, with complete remodeling of the callus present. There is evidence of significant angulation in many of the healed fractures suggestive of a lack of sophisticated knowledge of fracture reduction. No instances of peri-mortem fractures are noted in these remains.

The prevalence of traumatic injury in the Non Nok Tha adults is presented by sex and side in Table 5.128. The most prevalent fracture in males is spondylolysis of the fifth lumbar vertebra (5.9%), followed by fracture of the second cervical vertebra (4.3%), and the first metacarpal (2.9%). In females, the most prevalent fracture is also spondylolysis of the fifth lumbar vertebra (12.5%), followed by fracture of the seventh cervical vertebra (9.1%) and the possible fracture of the hamate (5.9%).

Table 5.127. Inventory of Trauma in the Non Nok Tha Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
1-4	F	35-40	MP 4	L5 vertebra	Probable spondylolysis, the inferior surface of the right superior articular facet is coarse and porotic, the left pars interarticularis is freshly broken.
1-8	F	55-60	MP 1?	Right radius	Healed fracture of distal shaft, 20° anterior-posterior angulations, apex anterior, 25° medial-lateral angulation, apex lateral. A faint line demarcates the fracture site.
1-22	M	40-45	MP 4	Left parietal bone	Healed, depressed, oval defect (10x7 mm) of the parietal bone superior to the asterionic suture. Rounded mound of bone present on the endocranial surface.
				Left rib	Healed fracture of a middle rib (5-9) at the angle, with flattening of the posterior body but no angulation or displacement.
1-28	F	25-30	MP 2	Left clavicle	Possible healed fracture of the proximal end. Enlarged and expanded medial end. Both clavicles are incomplete, left is shorter than right.
1-51	M	Adult	MP 8?	Right tibia	Large, remodelled callus of the midshaft of the fragmentary tibia. In the lateral view there is evidence of overlap of the fragments, 20° of angulation of the distal fragment (apex anterior). In the anterior view, little angulation. [Figure 5.31]
				Right knee	The right patella has a grossly expanded articular surface with circumferential lipping. A femoral condyle fragment exhibits moderate lipping on the lateral edge of the articular surface. Probably traumatic osteoarthritis secondary to fracture of tibia.
2-4	F	40-45	EP 1	?C7 vertebra	Cervical vertebrae are incomplete and poorly preserved. Healed fracture of the left lamina, with thickening of the pedicle and deformation of the superior facet. There is extensive osteophytosis of the superior end-plate of the second or third thoracic vertebra.
				Rib-?left	Small fragment of a rib (not the first rib) which has been fractured and displaced. The two overlapping fragments are completely fused together with a large amount of angulation.
2-7	M	35-40	MP 4	Right MC 1	Enlarged and flattened distal end with a smooth-walled defect of the lateral margin of the head. No reactive bone formation. Possible healed fracture.

Table 5.127 (cont'd.). Inventory of Trauma in the Non Nok Tha Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
2-9	M	35-40	MP 4	C2 vertebra	The left superior facet has a rounded, porotic lesion of the articular surface in the center of the facet (9x5 mm). This facet is depressed inferiorly when compared to the right, and the left inferior facet is enlarged.
2-27	M	50-60	MP 6	Left humerus	Healed supracondylar fracture. The humerus is missing the proximal end. The normal anterior curve of the distal shaft is absent. There is a raised ridge of bone above the anterior distal metaphysis. Osteophytosis and eburnation of the trochlea and capitulum. [Figure 5.32]
2-33	M	17-20	MP 4	L5 vertebra	Spondylolysis with complete separation of the neural arch at the pars interarticularis.
				Left tibia	Thickening of cortical bone (54x21 mm) along the medial border and spine of the anterior tibial shaft at the proximal end of the distal third. Intact marrow cavity, no evidence of angulation or reactive bone formation. Tibial contusion.
2-42	M	50-60	EP2	Left parietal	There is a 10 x 13 mm depression of the outer table at the lambdoidal suture, near the asterion. The internal table has a raised area of cortical bone. No reactive bone present on either table.
				Left MC 3	The styloid process is absent from the left third metacarpal. The capitate is not preserved. There is no angulation or thickening.
2-47	M	45-50	MP 4	Right clavicle	Pseudoarthrosis of the clavicle midshaft. The "articulating" distal and proximal ends are grossly expanded and flared, overlapping slightly. When joined, there is a 10 mm length discrepancy with the left side. The Right first rib has an inferiorly extended osteophyte at the tubercle. [Figure 5.33]
				Right first rib	The right first rib has a thickened and shortened neck region when compared to the left side. On radiograph there is a sclerotic oblique line of bone across the neck. Healed fracture.

Table 5.127 (cont'd.). Inventory of Trauma in the Non Nok Tha Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
2-60	F	25-30	MP 6	Left tibia	Circumferential thickening of the midshaft. Medial shaft with coarse linear striations and porosis along the posterior border of the tibia. Slight anterior bow. Difficult to evaluate rotation because of missing malleolus. Angulation of 10°. Healed fracture.
				Left fibula	Midshaft thickened in the anterior-posterior direction, with slight thickening along the medial border. Healed fracture.
2-78	F	40-45	EP 2	Left hamate	The hook is reduced when compared to the opposite side. No evidence of mal-alignment, callus or reactive bone formation. Healed fracture.
2-89	M	50-60	EP 2	Right scapula	Fragmentary element with a small perforation of the glenoid fragment, just posterior to the fossa and below the suprascapular notch. There is a healed ridge of bone with perforation in the bottom. Healed fracture.
2-117	F	50+	EP 3	Left clavicle	The distal end of the clavicle is angulated approximately 90° anteriorly, with little thickening of the shaft. Radiograph demonstrates a bridge of bone from the distal fragment across to the shaft on the anterior surface, otherwise complete remedullarization. Healed fracture.
2-124	F	35-40	MP 4	Left clavicle	The left clavicle is longer and thinner (7 mm) than the right. No evidence of thickening, angulation or callus. Possible childhood fracture.

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series. M=male, F=female, EP=Early Period, MP=Middle Period, MC=metacarpal, MT=metacarpal, C=cervical, L=lumbar, T=thoracic.

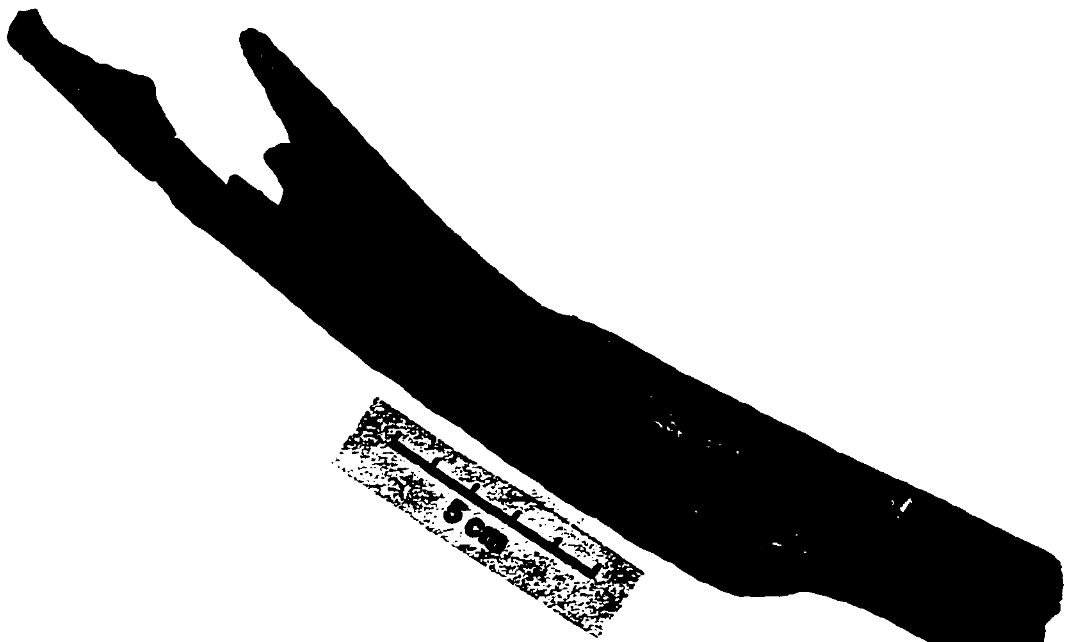


Figure 5.31. Healed Fracture of the Distal Tibia
There is evidence of overlap and angulation

The temporal distribution of these individuals suggests a slight increase in traumatic injury in the Late Group at Non Nok Tha (Table 5.129). Although the number of observed lumbar vertebrae is small, both cases of spondylolysis and both of the mid-shaft tibia fractures occur in the Late Group. Still, as at Ban Chiang, the absence of the typical fractures of interpersonal violence, the lack of a non-random pattern of elements affected and type of fractures, as well as the notable lack of skull fractures, all suggest the absence of warfare or ritualized violence at Non Nok Tha.

While the evidence of healed fractures in the Non Nok Tha skeletal series suggests the absence of warfare, conflict has been suggested in the nature of "headhunting raids" based on the presence "in all levels of both excavations . . . at least one burial which was either

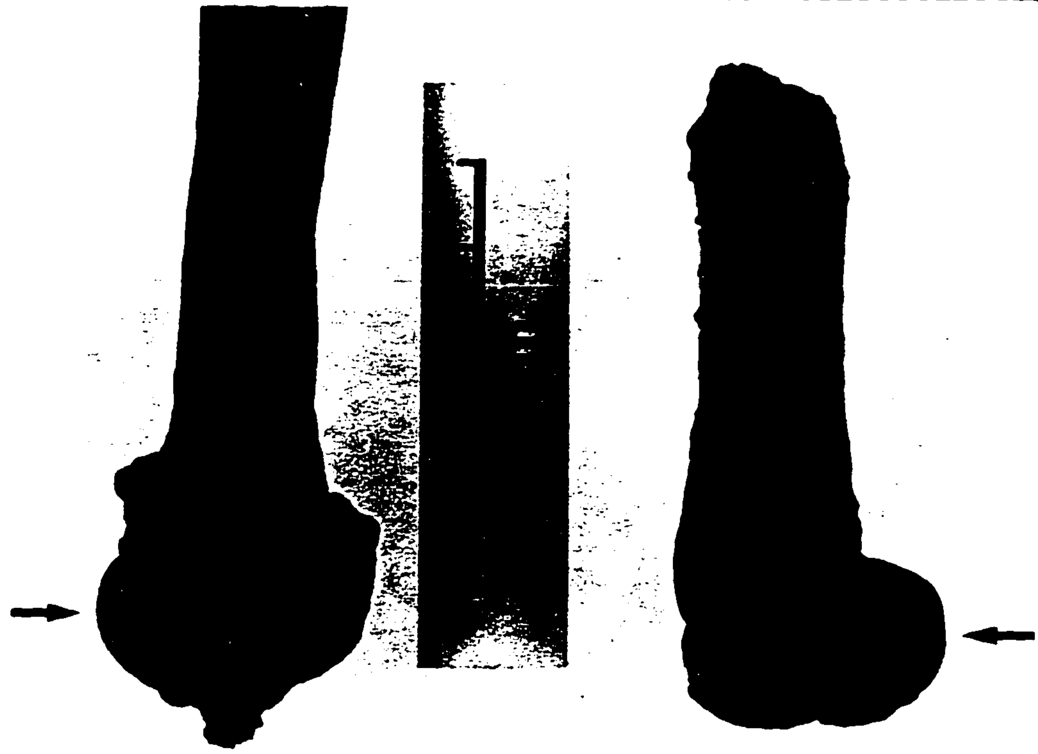


Figure 5.32. Healed Fracture of the Distal Humerus (at left)
Note the normal anterior projection of the condyles is lost (arrow)

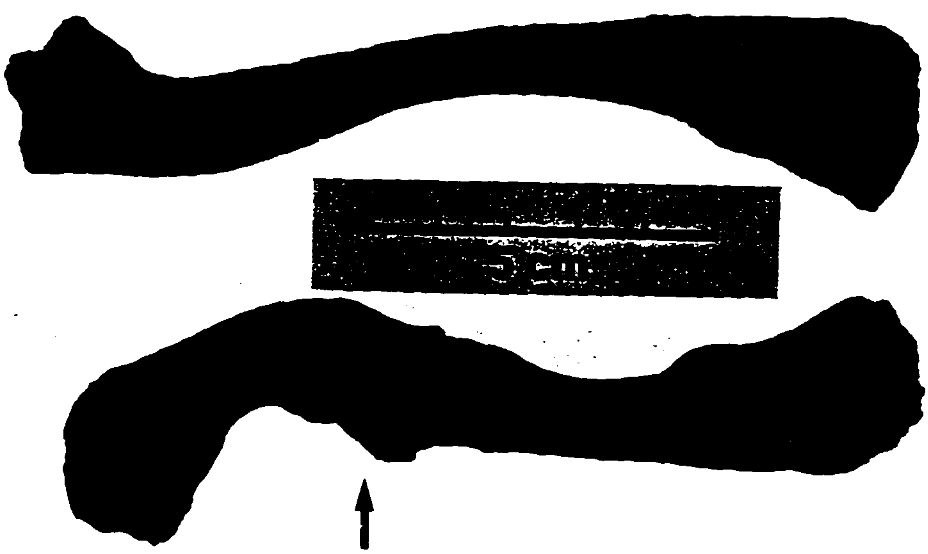


Figure 5.33. Unhealed Fracture of the Clavicle Midshaft (bottom)

Table 5.128. Prevalence of Trauma in Non Nok Tha Adults

Type of Trauma Element/Site Elements Affected	Male						Female					
	Right		Left		Total		Right		Left		Total	
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
FRACTURES												
Parietal bone	0/23	0.0	2/25	8.0	2/48	4.2	0/16	0.0	0/16	0.0	0/32	0.0
C2					1/23	4.3					0/20	0.0
C7					0/15	0.0					1/11	9.1
L5					1/17	5.9					1/8	12.5
Ribs*	1/134	0.7	1/143	0.7	2/277	0.7	0/91	0.0	1/87	1.5	1/178	0.6
Clavicle	1/29	3.4	0/23	0.0	1/52	1.9	0/18	0.0	3/20†	15.0	3/38†	7.9
Scapula Blade	1/20	5.0	0/22	0.0	1/42	2.4	0/14	0.0	0/16	0.0	0/30	0.0
Humerus-distal 1/3	0/30	0.0	1/20	5.0	1/50	2.0	0/17	0.0	0/29	0.0	0/46	0.0
Radius-distal 1/3	0/26	0.0	0/28	0.0	0/54	0.0	1/24	4.2	0/27	0.0	1/51	2.0
Hamate	0/6	0.0	0/11	0.0	0/17	0.0	0/9	0.0	1/8‡	12.5	1/17‡	5.9
Metacarpal 1	1/15	6.7	0/19	0.0	1/34	2.9	0/11	0.0	0/21	0.0	0/32	0.0
Metacarpal 3	0/21	0.0	1/19	5.3	1/40	2.5	0/16	0.0	0/19	0.0	0/35	0.0
Tibia-middle 1/3	1/27	3.7	0/30	0.0	1/57	1.8	0/33	0.0	1/35	2.9	1/68	1.5
Fibula-middle 1/3	0/20	0.0	0/21	0.0	0/41	0.0	0/23	0.0	1/21	4.8	1/44	2.3
CONTUSIONS												
Tibia-diaphysis	0/24	0.0	1/26	3.8	1/50	2.0	0/29	0.0	0/27	0.0	0/56	0.0

Note: A=affected, O=observed, C=cervical, L=lumbar. * Ribs counted by axial ends, not including first, second, tenth through twelfth. ‡ Includes one equivocal fracture.

Table 5.129. Distribution of Individuals with Trauma, By Element and Group, at Non Nok Tha

Affected Element Individuals	Early Group						Late Group				
	Early Period			Middle Period			Middle Period				
	1	2	3	1	2	3	4	5	6	7	8
Cranium		1					1*				
Clavicle			1		1‡		2‡+				
Scapula		1									
Humerus									1		
Radius				1							
Hand		2‡					1				
Tibia									1*		
Contusion							1*				1
Fibula									1*		
Vertebrae	1*						1				
Spondylolysis							2*				
Ribs	1*						2*+				

Note: * and + indicate trauma found in the same individual. ‡ Indicates an equivocal fracture.

headless, contained a skull obviously disarticulated at the time of burial, or contained one or more additional skulls" (Bayard 1971:41). The excavation burial registers record four burials as possible "decapitations" [Burials 1-63, 2-32, 2-39, and 2-47], two males and two females, all of which had a skull/crania within the interment. Crucial to the interpretation of this evidence then is the distinction between activities that may be associated with mortuary ritual (i.e. disarticulation after death) and those associated with warfare (removal of the head as a trophy). The amount of prehistoric disturbance in the burial features at Non Nok Tha suggests more detailed analyses of the mortuary and skeletal evidence in these identified burials is necessary before a final determination can be made.

INFECTIOUS LESIONS

No skeletal lesions suggestive of infection were observed in the subadult skeletal remains from Non Nok Tha. Nine adults, four females and five males, however, have osseous lesions suggestive of both active and healed infectious processes (Table 5.130). Two of these lesions are found in the appendicular skeleton: a lesion of the distal tibial shaft (Burial 2-85) which alternatively may be an osteochondroma (See Figure 5.38); and a lesion of the right acetabulum in a female (Burial 2-124). A single case of possible sequelae from otitis media is seen in a middle-aged male (Burial 1-30A)[Figure 5.34].

The lesions in the remaining six adults, three females and three males, share some common characteristics. All involve elements of the spine and os coxae, and all exhibit expansive, circular, osteolytic lesions with little evidence of reactive bone formation (Figures 5.35-5.37). These are typical characteristics of granulomatous infection, or a chronic infection with a slow growing pathogen, e.g. a fungal or mycotic infection (i.e. tuberculosis).

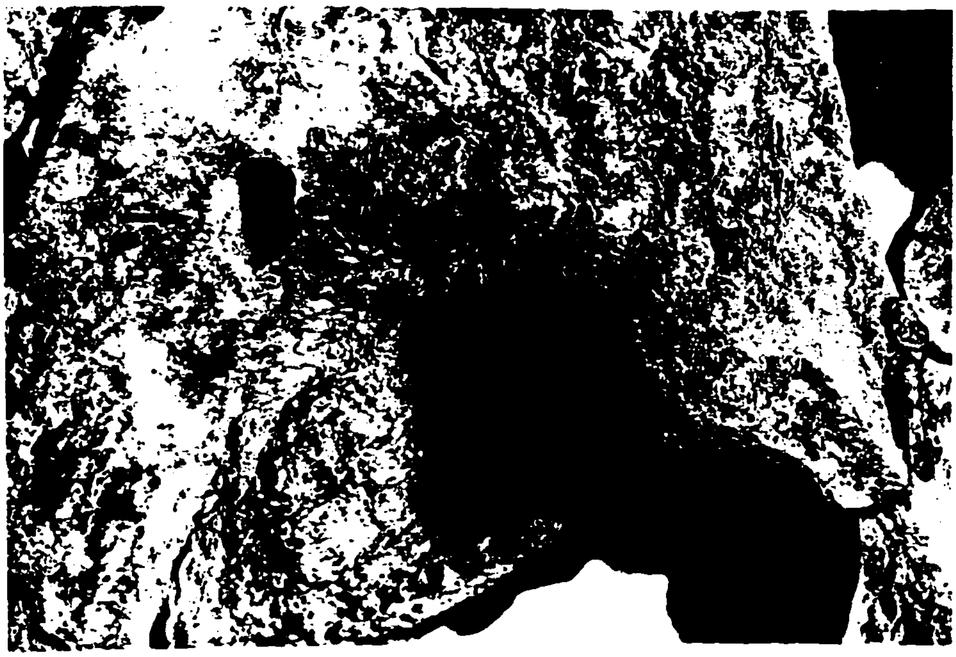


Figure 5.34. Smooth Walled Defect of the Suprameatal Triangle

Table 5.130. Inventory of Infection in the Non Nok Tha Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
1-2	F	40-45	MP 2	T2	The vertebra is incomplete. The rib facet is widely excavated on the left side of the body. The bone is smooth cortical bone. Radiograph demonstrates a small (5x7 mm) demineralized area with a sclerotic posterior margin.
1-12	M	35-40	MP 5	Right os coxae	There is a small, circular, cyst-like excavation of the anterior iliac blade, posterior to the auricular surface. There is no evidence of osteoblastic activity.
1-30A	M	40-45	MP 1	Right temporal	Smooth-walled, oval defect (4x2 mm) of the suprameatal triangle which penetrates the cortex. No evidence of reactive bone formation. (Figure 5.34)
1-34	M	40-45	MP 5	Left auricular	Erosion of the articular surface of the auricular surface, with a depression of the surface, at the base of which is a round, smooth-walled opening into the cancellous bone. There is no perforation of the posterior blade.
1-40	F	55-60	MP 8	T3 - T10	Complete fusion of these seven vertebrae in a kyphosis of greater than 100°. The vertebral bodies have collapsed, with retention only of the inferior end-plate of the tenth vertebra and the superior end-plate of the fourth, with the anterior surfaces of these two touching. No reactive bone. (Figures 5.35 and 5.36)
				L2	Smooth cavitation (7x7 mm) of the superior end-plate, with erosion around the edges of the defect. No evidence of reactive bone formation.
1-47	F	Middle age	MP 8	T2	Expansive lytic lesions of the superior body and the left inferior body. The first thoracic vertebra is missing
2-32	M	25-30	MP 4	T11	Expansive lytic lesion (9x8 mm) of the right lateral superior end-plate, without reactive bone formation. Impressions of the inferior end-plate at the right and left posterior sides (11x5 mm, 8 mm), with the larger of the defects connecting to the superior defect within the body. (Figure 5.37)
				T12	Erosion of the right anterior centrum with exposure of the trabeculae, several lobulated, expansive lesions penetrate the inferior end-plate without evidence of thickened trabeculae or new bone formation. (Figure 5.37)

Table 5.130 (cont'd). Inventory of Infection in the Non Nok Tha Skeletal Series

Burial ID	Sex	Age	Phase	Element	Description
2-85	M	45-50	MP 4	Left tibia	Circular, raised area of reactive bone formation (11x16x1 mm) on the posterior-medial surface of the distal tibia. The edges are well demarcated and the bone appears coarse and disorganized, like broccoli florets. Possible osteochondroma. (Figure 5.38)
2-124	F	35-40	MP 4	Right acetabulum	Area (16x6 mm) of fine, raised, reactive bone formation on the superior acetabulum, within the joint capsule near the anterior inferior iliac spine. Raised approximately 2-3 mm off the articular surface. The femoral head is too weathered for observations.

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series. M=male, F=female, MP=Middle Period, T=thoracic, L=lumbar.

Figure 5.35. Lateral View of the Fused T3 - T10 Vertebrae
Note the complete collapse of the centra (arrow) in Burial 1-40

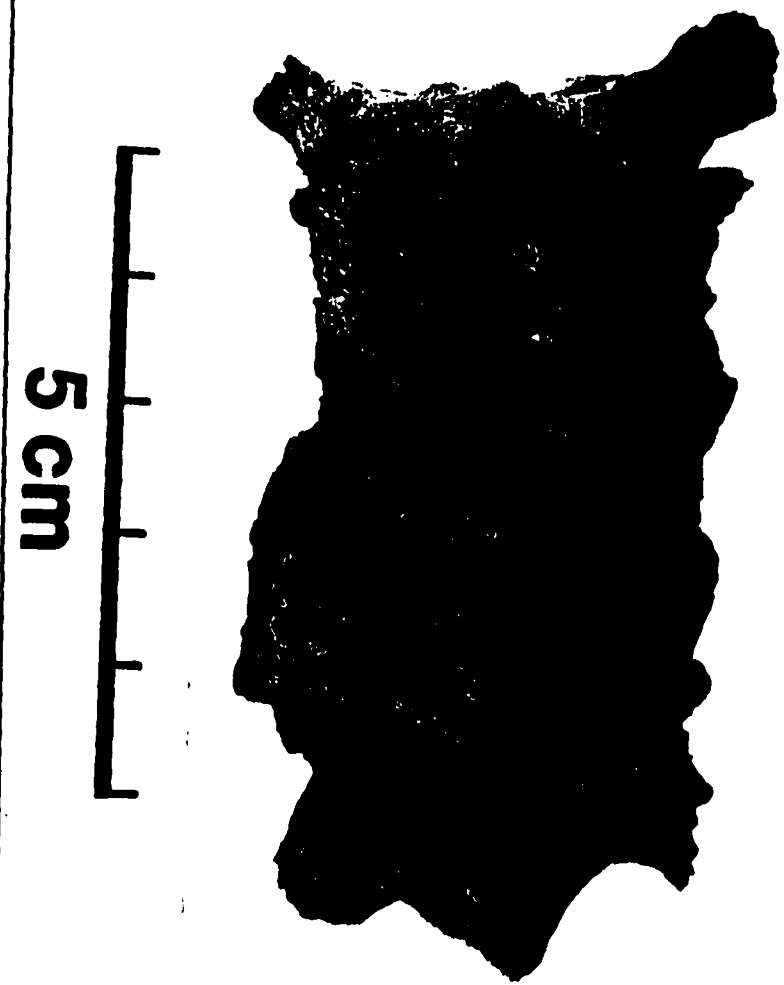


Figure 5.36. Posterior View of the Fused Thoracic Vertebrae
Note that although fused together, the posterior elements remain intact

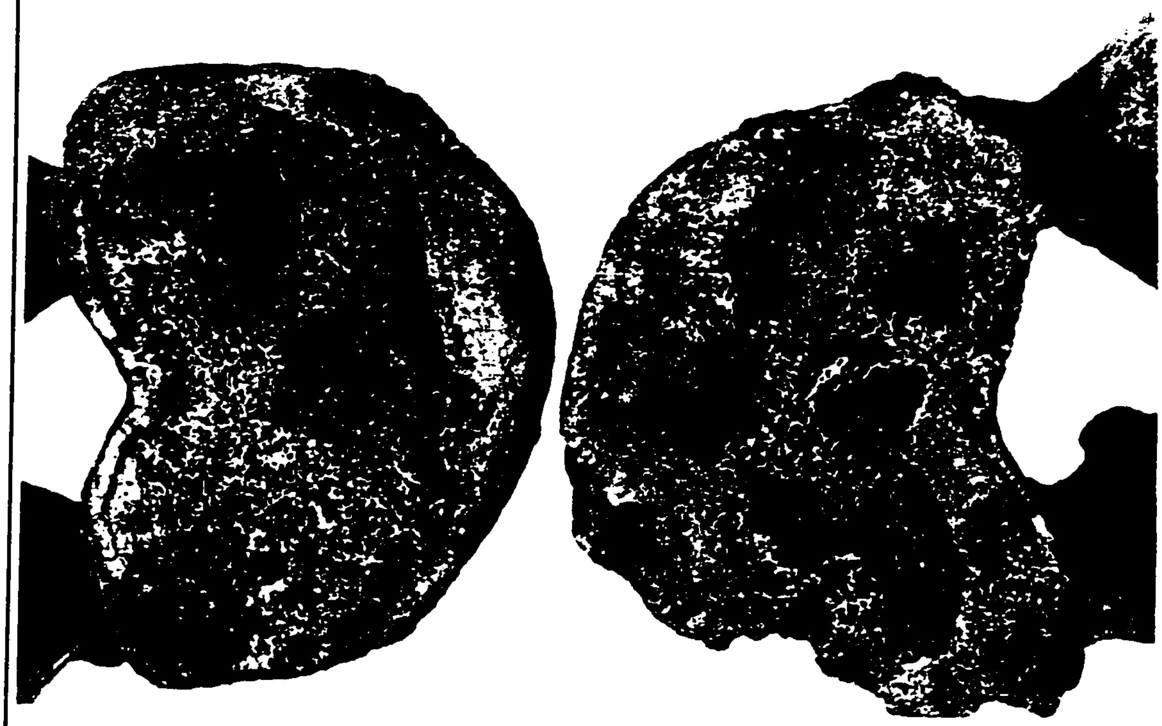


Figure 5.37. Possible Lytic Erosion of the T11 and T12 End-plates

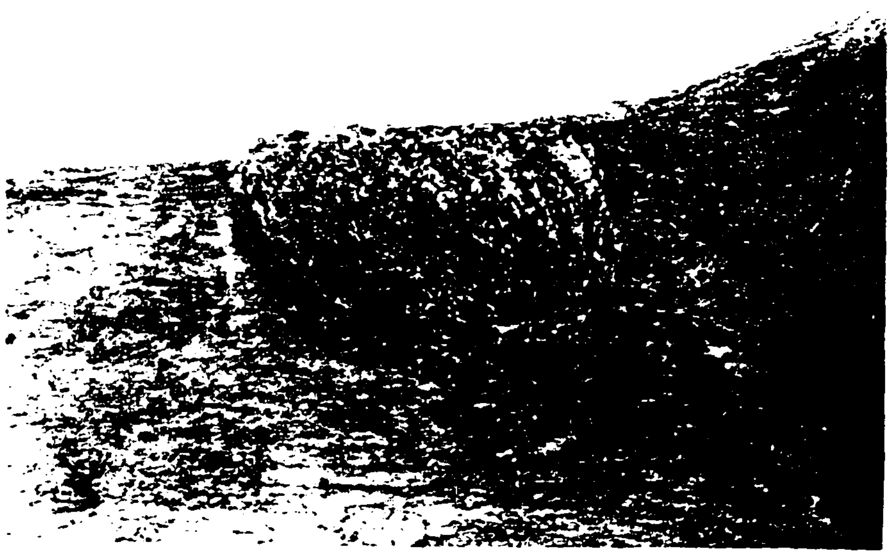


Figure 5.38. Raised Lesion of the Distal Tibial Cortex
Differential diagnosis includes periostitis or osteochondroma

Table 5.131. Prevalence of Infection in Non Nok Tha Adults

Element/Site	Male				Female				Total	
	Right		Left		Right		Left			
	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
Temporal	1/24	4.2	0/21	0.0	0/17	0.0	0/19	0.0	1/81	1.2
T1-12 Vertebrae	2/265		0.8		10/204		4.9		12/469	2.6
L1-5 Vertebrae	0/95		0.0		1/103		1.0		1/198	0.5
Ilium	1/14	7.1	1/15	6.7	0/8	0.0	0/13	0.0	2/50	4.0
Acetabulum	0/22	0.0	0/21	0.0	1/20	5.0	0/20	0.0	1/83	1.2
Tibia-Shaft	1/24	4.2	0/26	0.0	0/29	0.0	0/27	0.0	1/106	0.9

Note: A=affected, O=observed, T=thoracic, L=lumbar. Counted individual vertebral bodies.

Estimated prevalences for the suspected infectious lesions in Non Nok Tha adults support their rarity (Table 5.131). The lesions of the vertebral bodies which are suspicious of tuberculosis or other mycotic or fungal infection are more common in female vertebrae (11/307, 3.6%) than male vertebrae (2/360, 0.6%). However, two possibly associated lesions of the ilium are noted in males (2/29, 6.9%).

The temporal distribution of the individuals from Non Nok Tha with evidence of infection shows a clustering in the later phases (Table 5.132). Six of the nine individuals with infectious lesions are from the Late Group (6/9, 66.7%), including all but one of the suspected lesions of tuberculosis. The absence of any lesions in subadults from Non Nok Tha is mysterious, and not readily explainable, other than to suggest either low levels of infection or other stressors, or acute death.

Table 5.132. Temporal Distribution of Individuals with Infection at Non Nok Tha

Affected Element Number of Individuals	Early Group						Late Group				
	Early Period			Middle Period			Middle Period				
	1	2	3	1	2	3	4	5	6	7	8
Temporal bone				1							
Auricular surface								2			
Hip							1				
Tibia							1				
Vertebrae					1		1				2

CHAPTER 6. BAN CHIANG AND NON NOK THA

This chapter expands on the bio-archaeological model by individualizing it to the northeastern Thailand archaeological samples. Following the format of the previous chapters, the indicators of stress are contrasted between the two sites with limited comparisons to the coastal Thailand sample from Khok Phanom Di, a South Asia sample, and some Amerindian populations.

BIO-ARCHAEOLOGICAL MODEL

The traditional bio-archaeological model of human health and disease (Cohen and Armelagos 1984) holds that with the advent of agriculture, there is a movement toward sedentism and reliance upon a single, or limited, food resource (typically a high carbohydrate grain, e.g. corn, rice). The broad-based subsistence system of hunter-gatherer-cultivators is balanced, less susceptible to environmental unpredictability, and suggests the absence of nutritional stress (Strickland 1990).

The transition to sedentism or "domestication of the people" (Higham and Maloney 1989) is likely the more crucial process (Armelagos 1990). Sedentism creates sanitation problems which result in an increase in parasitic disease spread by human waste, increased contact with zoonoses, and crowding. Landscape change associated with the creation of the wet-rice paddy field system of agriculture prevalent in Thailand today may create ideal habitats for disease vectors such as snails (see also Chaowagul et al. 1989).

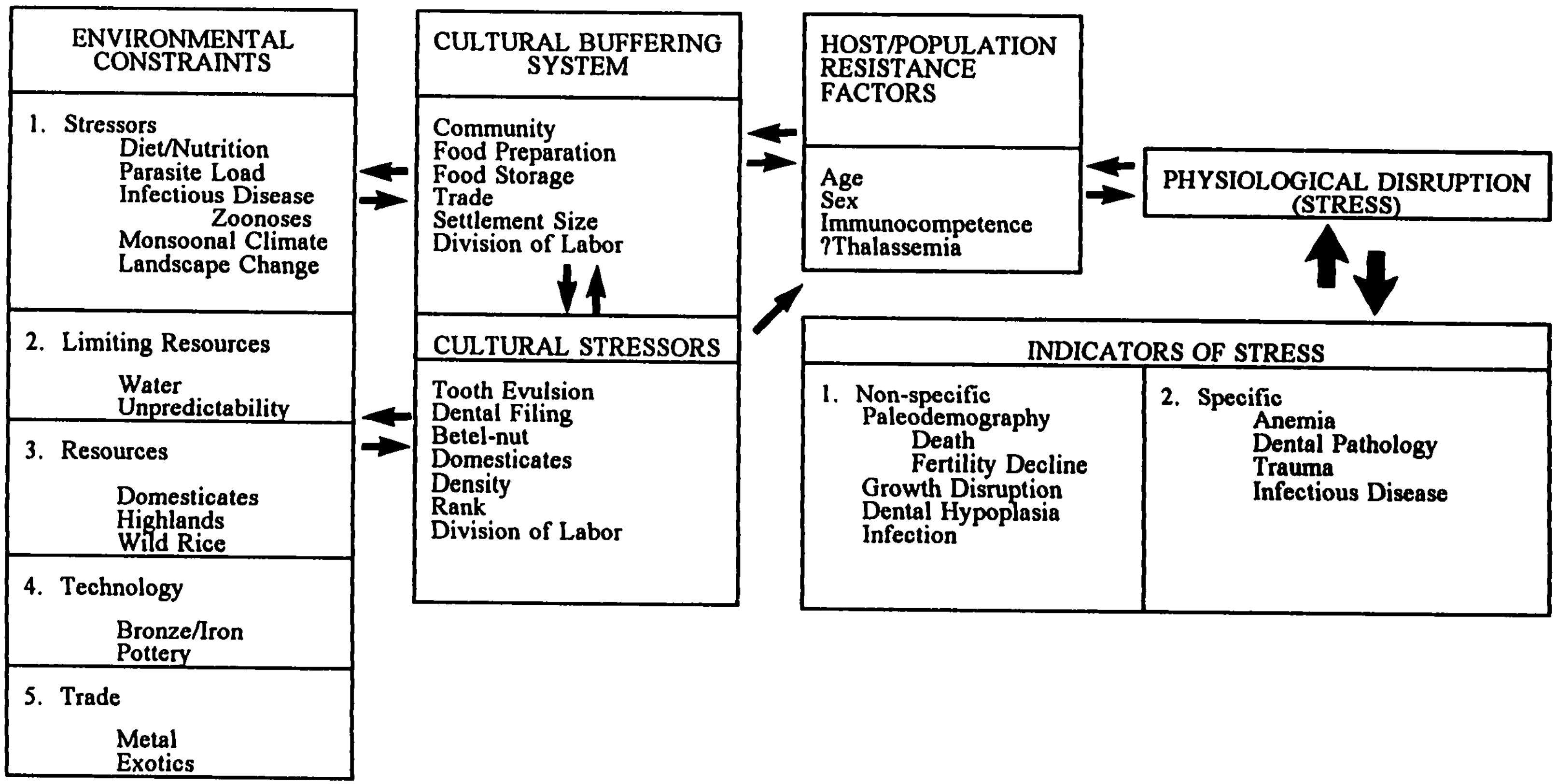


Figure 6.1 Northeastern Thailand Bio-archaeological Model

Low levels of stress indicators (e.g. infectious lesions such as abscessing, caries, periostitis; iron deficiency anemia, osteoarthritis, fractures, etc.) are found in the mobile or semi-sedentary hunter-gather-cultivators. Advancing technology in food processing, adoption of agriculture, and sedentism, contribute to an increase in stress (e.g. Cohen 1977, 1988), and it is in interpreting these "increases" in certain of the indicators, such as changes in paleodemography (e.g. decline in "life expectancy"), that more careful consideration must be given than was demonstrated in the initial effort (Cohen and Armelagos 1984). The model, however, remains valid as a standard of expectations against which to test new data and new interpretations.

Applying this model to the ancient inhabitants of northeastThailand, generates the two hypotheses introduced at the beginning of this dissertation. First, that they are generally "healthy" implying low levels of the stress indicators; and second, that there will be an increase in stress indicators over time. This proposed increase is based on the known progress in northeastThailand, from a broad-based foraging-cultivating strategy to a "systematic, focused, and integrated" economy based on rice agriculture (White 1995).

Utilizing the available archaeological evidence, as well as educated speculation based on modern medical, epidemiological, and ethnoecological studies, inferences on the prevalent environment, probable subsistence systems, and resources available to the ancient inhabitants of northeastThailand can be made. These data can be used to fill out the bio-eco-archaeological model proposed earlier (Figure 6.1).

The lack of uniformity and consistency in cultural attributes of these early archaeological sites has been suggested as an adaptive response to the unpredictability of the monsoonal climate of Thailand (Wilen 1986, Kennedy 1976, Welch 1985). In addition, there appear to have been large differences in local climate, soils and resources, resulting from the presence of mountain ranges and river valleys, which create "micro-environments". Thus, although the modern village of Ban Chiang and the archaeological site of Non Nok Tha are some 100 miles apart, the available resources may have been quite different.

Ban Chiang and Non Nok Tha are also different in another respect. Evidence of habitation recovered throughout the Ban Chiang excavation sequence suggests the site was a village, much as it is today. In contrast, the mound of Non Nok Tha was used principally as a cemetery, perhaps by scattered clusters of related persons rather than a nucleated village (Bayard and Solheim in press, Wilen 1986). The site was abandoned several times in its history, suggesting more mobility in the early use of the site than is implied in the Ban Chiang sequence.

Both sites share common characteristics which are likely to have had an effect on the health of the inhabitants. Cattle, pig and dog are present at both sites from the earliest levels, and, based on the available osteological evidence, are believed to be been domesticated (Higham 1975, 1977; Higham and Kijngam 1979, Higham et al. 1980, 1981). The cattle are not believed to have been used as draft animals (Higham 1975, Higham et al. 1981). All three of the animals are suggested as a food source by the inclusion of whole, articulated limbs of cattle, pig and dog within the burial interment at Non Nok Tha. At Ban Chiang, no such mortuary practice is repeated, but faunal remains of these animals were recovered from non-burial contexts (e.g. burned and cut bone). Milk is unlikely to have been used as a food product since the present inhabitants of Thailand are intolerant of lactose (Groves 1985). Domesticated animals, in addition to supplying a ready source of protein, also provide a reservoir for a variety of zoonoses: e.g. anthrax, brucellosis, tuberculosis.

Wild sources of meat protein likely to have been utilized include fish, and other aquatic life such as frogs, turtles, snakes. Forest animals, found primarily at Ban Chiang, include three species of deer, possibly wild pig and cattle, tiger, rabbit, civet, and birds. Although few arboreal mammals are recovered from Ban Chiang, they are denizens of the evergreen forest which lies near the mound of Non Nok Tha.

Wild animals also act as vectors or reservoirs for a variety of zoonoses, including typhus, trichinosis, tularemia, leptospirosis, and schistosomiasis transmitted through a fresh water snail vector (Brothwell 1991). Pigs and cows share the helminth parasite, tapeworm (*Taenia solum)*, with humans, transmitted by eating raw or undercooked meat, and resulting in cysticerci infection (Desowitz 1981). Intestinal worms, especially hookworm (*Ankylostomia*), "is the commonest cause of chronic hemorrhage in the world" (Hutt and Burkitt 1986), resulting in an iron deficiency anemia, which is complicated by poor nutrition, folic acid deficiency, hemoglobinopathies and malaria, among others.

Also apparent in this reconstruction, is that early inhabitants of both sites had access to rice of some kind, either wild, domesticated, or both; as well as other plant food sources, such as yams, beans, gourds, squash and nuts (Yen 1977, White 1989, Gorham 1970). The exact progress from wild rice to paddy field cultivation of domesticated rice in Northeastern Thailand is important to this dissertation only in the probable stage occupied by the inhabitants of Ban Chiang and Non Nok Tha. The skeletal evidence may help in this determination (e.g. Larsen 1987).

Evidence for food processing is less available, because the majority of ceramics recovered in both excavations are ritual vessels, rather than everyday cooking and storage ware. Pottery is present from the earliest levels at both sites and although there are changes in vessel types, decorations, slips, etc., changes in function can only be surmised. Bayard (1984) suggests that vessels recovered from Non Nok Tha could be divided into storage and cooking vessels based on stability and the size and shape of the mouth. Small fish vertebrae found in the bottoms of some vessels suggest they might have contained fermented fish paste, a modern staple protein source (Bayard 1971, 1984).

Infection - Malaria

"Small group" infections other than malaria, include tuberculosis, herpes, water borne infections such as cholera, typhoid, amoebic dysentery, and giardiasis (Desowitz 1981). While most of these illnesses are invisible in the skeletal record, they would act on the general morbidity of the affected population.

Since malaria is currently endemic in Thailand, is a significant cause of morbidity and mortality, and the inhabitants exhibit a variety of hemoglobinopathies presumed to confer some immunity to the disease, an appreciation of malaria is crucial to this investigation of ancient health and disease in Thailand. Malaria is an infection with the parasite, *plasmodium*, transmitted by the *Anopheles* mosquito, which results in proliferation of the parasite within the human red blood cells. Clinical symptoms of infection include cyclical fever (upon release of toxins), chills, anemia, jaundice, renal failure, infections, and death by segregation of massive numbers of parasites within the brain, liver, spleen and/or lungs.

Human malaria, likely originated as a zoonoses from a variety of possible mammalian and/or primate malarias (Fiennes 1978) in Southeast Asia (Bruce-Chwatt 1988, Diamond 1989, Poolsuwan 1991, 1995). Poolsuwan proposes low levels of endemic malaria in early Holocene hunter-gatherers in Southeast Asia based on the presence of deep forest vectors with wide ranges and predicated upon the return of a human group to within 3 km of the previously infected group of mosquitos. Landscape change may drastically affect the presence of mosquito vectors for the disease, as shown by Livingstone (1967) in Africa when forest clearing precipitated an epidemic of malaria.

Two principal vectors of malaria exist in Thailand, each enjoying a different habitat: forest fringe (*An. dirus*) and small, cool, clear water streams (*An. minimus*). Poolsuwan (1995) suggests that these mosquitos would have affected early settled populations at the forest fringe, such as Non Nok Tha and Ban Chiang. The presence of these two vectors each with slightly different peak activities would have resulted in year-round endemicity with peaks in the rainy season. Because of a laok of major vectors, coastal residents and those moving out onto the alluvial plain in the latter prehistory of Thailand would have been relatively free of malaria (Poolsuwan 1995).

In a parallel analysis of the frequencies of the principal hemoglobinopathies of northern India, southern China and Southeast Asia, Poolsuwan (1991) proposes that the Hgb E mutation is likely to have existed as a sporadic polymorphism in the early nomadic inhabitants of the region. With the movement toward sedentism and increased numbers and densities of people, Hgb E as well as β-thalassemia would have "attained appreciable polymorphic frequencies . . ., with a tendency for the first to replace the latter over the long term" (Poolsuwan 1991:186). These conclusions suggest that both malaria and the effects of thalassemia would have been factors in the morbidity and mortality of the inhabitants of Non Nok Tha and Ban Chiang.

Malaria is an extremely diverse parasitic infection, with its effects dependent upon the type of parasite, degree of endemicity, period of infectivity (seasonal, year-long), presence of hemoglobinopathies, and degree of immunity (Bruce-Chwatt 1985). Cumulative infections with malaria confer a state of immunity, so the effects of infection decline over the lifetime of an individual. The presence of fetal hemoglobin, as well as maternal antibodies, protects the newborn infant to approximately 6 months (Edwards 1987). Children aged one to four years have the greatest parasitemia and clinical illness, with age-at-weaning affecting the passive immunity conferred in breast milk.

Pregnant women appear to be highly susceptible to malaria infection and have high rates of parasitemia, possibly related to immunosuppression. The placenta acts as a preferential site for parasite sequestration and interferes with fetal nutrition, resulting in fetal distress, abortion. stillbirth, and maternal death, as well as congenital malaria infection and low birth weight infants (World Health Organization 1986). The effects are more severe in the first pregnancy than later ones.

Thus, both malaria and the presence of hemoglobinopathies (See Chapter 1) affect maternal fertility and early childhood mortality, and may have been acting on the ancient inhabitants of Non Nok Tha and Ban Chiang. If the landscape change associated with the advent of paddy-rice agriculture dislocates the prevalent mosquito vector as supposed by Poolsuwan (1991, 1995), then the effects of malaria are likely to decline in the Late Group at Ban Chiang.

Cultural Stressors

Returning to the model, cultural factors act both as a buffering system and as stressors. Associated with sedentism are changes in food processing and storage systems which serve to provide a hedge against environmental catastrophe, provide alternative weaning foods, attract rodents, and may introduce additional disease due to spoilage. Community child-rearing, specialization in activities which might provide trade goods, and shared labor are additional benefits that may act as stressors. Cultural practices such as deliberate tooth ablation, leaves the individual without the full complement of teeth, and may act to alter the normal jaw and masticatory mechanics.

Betel-nut (*Areca catechu),* recovered in Spirit Cave, results in a state of euphoria when "chewed", and is chewed by modern inhabitants of Southeast Asia. Betel-nut is an inhibitor of thiamine, the deficiency of which causes beriberi. Betel-nut chewing is also a known oral carcinogenic, but also acts as a caries inhibitor - presumably because the dark reddish-brown stain resulting from its use acts as a physical barrier to bacteria (Howden 1984). Betel-nut chewing is thought to increase periodontal disease including alveolar resorption. The use of betel-nut by the ancient inhabitants of Thailand can only be inferred - there is no evidence of the dark reddish-brown stain associated with the practice in modern New Guinea and ancient Mariana Islanders (c.f. Howden 1984, Stern and Hanson 1995).

Crucial to the interpretation of this model, the natural history of infectious diseases such as malaria, and the perils of sedentism, is that there is change over time. Technological changes, such as the discovery and use of metal, followed by the development of iron with its superior strength; human-induced landscape change; population density changes; natural selection of immunocompetence and hemoglobinopathies; and so on, affect changes in mortality, fertility, and the indicators of stress defined here. Successful interpretation requires introducing and considering the multifactorial possibilities, making educated inferences, cautiously reading the data, and identifying the risks.

The first hypothesis, that the early inhabitants of Northeastern Thailand were generally "healthy", may be addressed by using the complete samples from both sites. The second hypothesis, that there is an increase in stressors and indicators over time, should be addressed using the temporal sub-samples. One of the initial premises of this research was to combine the Ban Chiang and Non Nok Tha skeletal samples, to facilitate a definitive look at change over time. As seen in the previous two chapters, the sample sizes are tantalizingly small and when sectioned into sex and group sub-samples, often result in inadequate sample sizes for statistical confidence. However, combination of the observations from the two sites requires an analysis of their conformity to each other - ideally, each site should demonstrate similar frequencies of stress indicators, with similar sex and group differences.

It must be recognized as well that, although contemporaneous, the chronological time periods represented by the groups within each site may not be comparable. The Early Group at Non Nok Tha might actually represent an earlier point in the progression toward sedentism, than the Early Group at Ban Chiang. While the Late Group at Ban Chiang reflects a period of time in which technology is changing (i.e. appearance of iron), the Late Group at Non Nok Tha is a full representation of the bronze age. It might be feasible then, to contrast the Late Group at Non Nok Tha with the Early Group at Ban Chiang for possible affinities (White, personal communication).

Whether or not the two samples can be combined, examining the levels of the indicators of stress relative to each other will assist in interpreting the bio-archaeological model and addressing the two hypotheses. During this discussion of the Ban Chiang and Non Nok Tha indicators of stress, brief comparisons will be made with the Khok Phanom Di skeletal series (Tayles 1992), and other applicable samples. These comparisons are by no means exhaustive or meant to be expansive, they are merely to provide a suggestion of where the Northeastern Thailand populations fit within the global assessment of these indicators.

PALEODEMOGRAPHY

The Non Nok Tha skeletal sample is larger, and at least the 1968 series, is slightly better preserved than the Ban Chiang assemblage. Both the Non Nok Tha and Ban Chiang skeletal series suffer from all four of the archaeological biases, especially differential burial practices, which have altered the recovery of subadult individuals over time. Both samples are small by paleodemographic standards (Konigsberg et al. 1989); still, general conclusions can be drawn. Age-at-death could only be generally estimated in a large number of the adults in each sample (Ban Chiang n=40, Non Nok Tha n=47). Exempting these, the age distribution of the two sites is similar (Figure 6.2), though the Non Nok Tha sample has a larger number of older individuals. Since the methodologies used to estimate age-at-death in each of the series were the same, and done by the same researcher, it is likely that the Non Nok Tha sample actually contains more older adults than that at Ban Chiang. The bias of the aging methods toward younger age intervals is not as evident in the Non Nok Tha skeletal series.

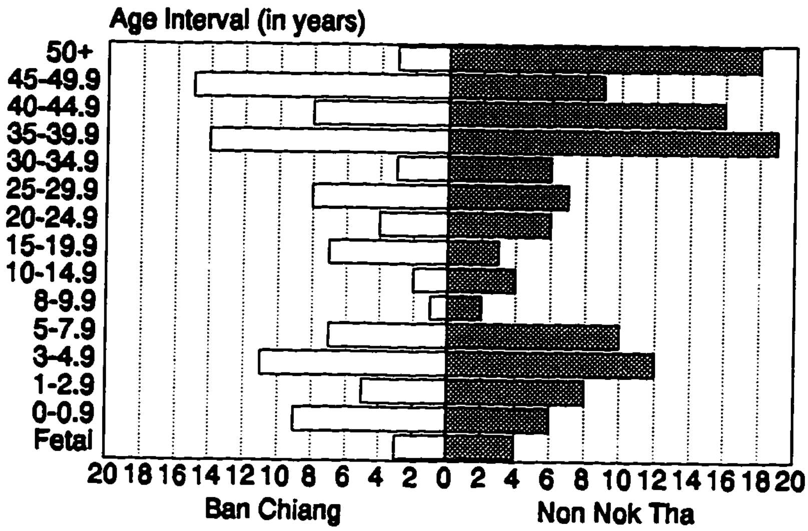


Figure 6.2. Age Distribution of Northeast Thai Skeletal Samples

A second way of assessing the equality of the skeletal samples is by a statistical test of the demographic distributions (Larsen 1984). Whether or not the adults of indeterminate age are proportionally apportioned, the distributions are found to be statistically similar (Table 6.1). This fact may result as much from use of similar aging methodologies as the actual similarities between the populations.

Table 6.1. Age and Sex Distribution of the Burials from NortheastThailand

Age Interval (in years)	Non Nok Tha		Ban Chiang		Difference
	Total	Cum. %	Total	Cum. %	
NB - 4.9	29	0.225	25	0.260	0.035
5 - 9.9	12	0.318	7	0.333	0.015
10 - 14.9	4	0.349	2	0.354	0.005
15 - 19.9	3	0.372	7	0.427	0.055
20 - 24.9	6	0.419	4	0.469	0.050
25 - 29.9	7	0.473	8	0.552	0.079
30 - 34.9	6	0.519	3	0.583	0.064
35 - 39.9	19	0.667	14	0.753	0.086
40 - 44.9	16	0.791	9	0.823	0.032
45 - 49.9	9	0.860	14	0.969	**0.109**
≥50	18	1.000	3	1.000	0.0
TOTAL	129		96		

Note: Includes only individuals with specific age-interval estimates. Cum. %=Cumulative percent, NB=newborn. Kolmogrov-Smirnov test for equal distributions (p=>0.05). D_o=0.109 < $D_{\alpha=0.05}$=0.183, therefore cannot reject the H_0.

Because of the large number of adults of indeterminate age, discussion will focus on alternative paleodemographic analysis which depends upon the subadult segment of the population (e.g. Jackes 1992, Buikstra et al. 1986). Since these skeletal assemblages are accumulated over long time periods, an assumption of stationarity is allowable in examination of the total samples (Table 6.2). The Ban Chiang sample includes more adolescents than at Non Nok Tha. While the adult sex ratio is nearly equal at Ban Chiang, it is skewed toward females in the Non Nok Tha series, although not enough to suppose differential mortality or burial practices.

The 20+/5+ statistic suggests a birth rate of 27.02 at Non Nok Tha and slightly higher rate at Ban Chiang (29.66) indicating both samples have average fertility. Interpreting the life expectancy at birth (e^0_{birth}) as the inverse of the birth rate, suggests a comparable birth rate of 3.4 at Ban Chiang, and 3.2 at Non Nok Tha (Sattenspiel and Harpending 1983).

Table 6.2. Paleodemographic Variables in Northeast Thailand Skeletal Samples

Sample	Sample Distribution				Sex Ratio†	e^0_{birth}‡	20+/5+	JA Ratio	MCM
	N*	<15	15-20	>20					
Ban Chiang	137	25.5%	5.1%	69.3%	51:47	29.21	0.848	0.105	0.053
Non Nok Tha	176	27.0%	1.7%	74.0%	60:67	30.85	0.871	0.125	0.0447

* Does not include fetal remains (Ban Chiang n=3, Non Nok Tha n=4). † Adults (greater than 15 years of age). ‡ Life expectancy at birth from a traditional life table, actually mean age-at-death, inverse of the birth rate (Sattenspeil and Harpending 1983).

Interpretation of the overall fertility based on the MCM:JA ratio is similar, with a predicted fertility of about three at Ban Chiang and between three and four in the Non Nok Tha sample (Jackes 1992). Locating the two Northeastern Thai samples on the plot of archaeological, historic, and model samples (Figure 6.2), again suggests both samples are relatively unbiased, falling within the scatter plot, and are in the region of stationary or slightly decreasing populations.

Both samples exhibit declining MCM and JA Ratios in the later phases, reflecting a decline in fertility. This decline in fertility is opposite what is hypothesized in the transition toward sedentism and agriculture (e.g. Buikstra et al. 1986, Konigsberg and Frankenberg 1994), with improved weaning food contributing to a shorter birth interval.

Contrasting the Non Nok Tha and Ban Chiang skeletal series with that from Khok Phanom Di (Tayles 1992, Higham and Bannanurag 1990, 1991), might further the evaluation of these paleodemographic changes. In contrast to both Northeastern Thai series, all burials encountered in the Khok Phanom Di excavation were completely removed (i.e. if the lower

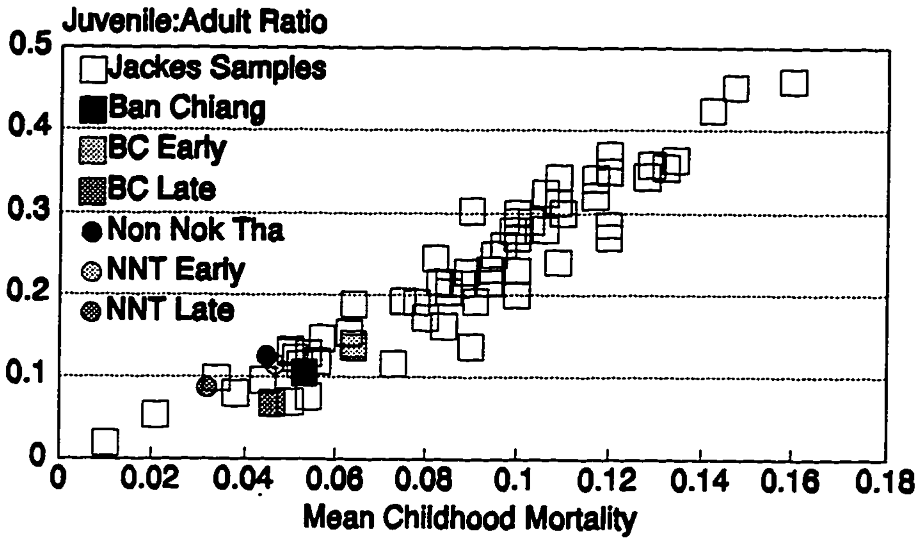


Figure 6.3. JA:MCM Plot of NE Thailand Samples

legs were in the excavation square, the remainder of the burial was retrieved from outside the side walls), resulting in fairly complete skeletons. Although concretions are a major problem at the site, overall preservation was much better, resulting in the recovery of more complete crania. The skeletal sample is slightly later in time than the two Northeastern Thai samples, but as discussed previously, there were no domesticated animals present.

In a comparison of selected paleodemographic estimations at the three sites (Table 6.3), a difference instantly apparent is in the number of subadults recovered in the Khok Phanom Di excavations. This high frequency, along with only a single individual with the maximum age-at-death estimation of 50+ years, contributes to the very low life expectancy at birth (15.91 years).

Table 6.3. Paleodemographic Variables in Selected Thai Skeletal Samples

Sample	Sample Distribution				Sex Ratio†	e^0_{birth}‡	20+/ 5+	JA⁎	MCM ⁎
	N*	<15	15-20	>20					
Ban Chiang	137	25.5%	5.1%	69.3%	51:47	29.21	0.848	0.105	0.053
Non Nok Tha	176	27.0%	1.7%	74.0%	60:67	30.85	0.871	0.125	0.045
Khok Phanom Di	154	55.8%	5.2%	39.0%	32:36	15.91	0.75	0.20	0.091

* Does not include fetal remains (Ban Chiang n=3, Non Nok Tha n=4). † Adults (greater than 15 years of age). ‡ Life expectancy at birth from a traditional life table, actually mean age-at-death, inverse of the birth rate (Sattenspeil and Harpending 1983). ⁎ From Jackes 1992, abridged life table presented in Table B.39..

While the Khok Phanom Di sample is positioned within the major scatter distribution of archaeological, historical and model life table distribution, it is very distinct from the two Northeastern Thai samples (Figure 6.4). The Khok Phanom Di sample falls in the region of increasing populations, compared to the stationary or decreasing position of the Northeastern Thai samples (Jackes 1994).

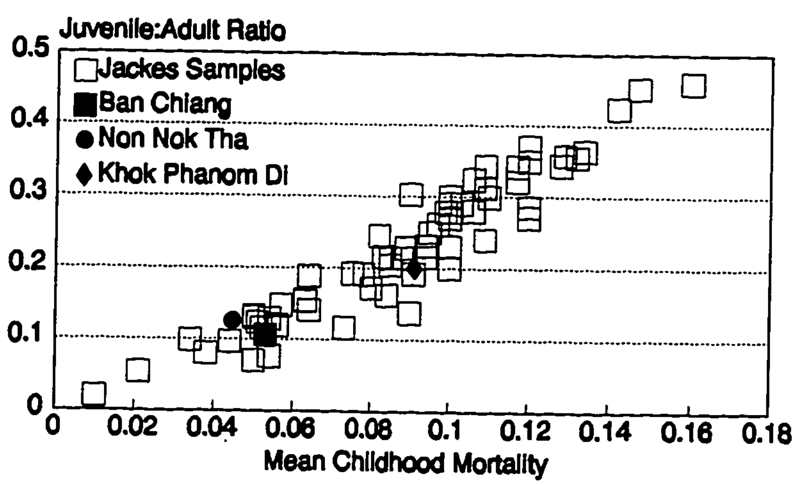


Figure 6.4. JA:MCM Plot of Khok Phanom Di Skeletal Sample

Estimated fertility at Khok Phanom Di is five to six (Jackes 1994), consistent with the low 20+/5+ statistic which is inversely related to the birth rate. The recovery of subadult skeletons at Khok Phanom Di is greatest in the early levels, and declines over time, suggesting that either mortuary behavior changed, fertility declined, or childhood mortality declined.

Since it is likely that all three of these sites are affected by biases of various kinds, it is unlikely that any are representative of the true paleodemography of the area. The only trend which appears to emerge in other archaeological demographic reconstructions is a "slight decrease in the skeletally derived mean-age-death with the adoption of agriculture or intensification of agriculture" (Konigsberg and Frankenberg 1994). This trend, interpreted from a "fertility" perspective, is more likely to reflect increasing fertility rather than any change in life expectancy. However, ethnographic analysis of living populations experiencing similar transitions (e.g. Kung San) suggests that the sedentism/agriculture complex does not alter female fertility, but instead acts to decrease childhood mortality (Pennington 1992). The biological and environmental factors affecting human vital rates and the complexity of interpreting paleodemographic data, suggest that any conclusions must be treated as tenuous and subject to change.

GROWTH

Subadult diaphyseal lengths have been shown to decline with an increase in physiological stress, resulting from introduced infectious disease, warfare, or changes in subsistence economy (Larsen 1987, Cook 1984). Subadult diaphyseal length samples are small at both Ban Chiang and Non Nok Tha, and thus are little suited to regression calculations or projected growth-age curves (e.g. Cook 1984, Mensforth 1985). The humerus was the most commonly recovered diaphyses in both sites, and is chosen for comparison.

Figure 6.5 demonstrates a consistent progression in length in both samples, with a tendency for a plateau in diaphyseal length at 18 m to 3 years, and at the 4 to 6 year age ranges. The plateau effect may be a reflection of small sample sizes, aging inaccuracy or an actual growth depression because of stress in these age ranges. No obvious differences between the two samples are noted, and no sex differences or temporal changes could be discerned in either the Ban Chiang or Non Nok Tha sample.

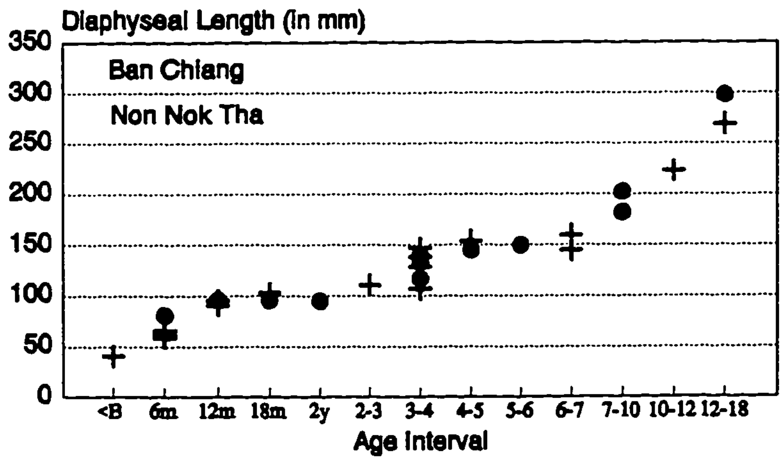


Figure 6.5. Comparison of Humeral Diaphyseal Lengths

Adult Stature

The model of increased physiological stress with the transition to sedentism and changes in subsistence predicts a decline in adult stature and therefore a decline in long limb bone lengths. The mean statures, by sex, for the two Northeastern Thai samples are presented in Table 6.4. There are no statistically significant differences in the means of the two samples, although the Ban Chiang female mean is slightly greater than the Non Nok Tha mean and has a lower standard deviation suggesting more homogeneity. Mean stature is estimated at approximately five feet five inches in males, and five feet in females in both samples.

Table 6.4. Mean Stature Estimates (in cm) in the Ban Chiang and Non Nok Tha Adults

Formulae* Site	Male				Female			
	n	Mean	SD	Test	n	Mean	SD	Test
Ban Chiang	29	165.7	3.6	t=0.3391 p=0.7358	25	154.1	2.9	t=0.5875 p=0.5593
Non Nok Tha	32	165.4	3.5		31	153.5	4.0	

* Thai-Chinese formulae (Sangvichien et al. 1985, nd). Note: SD=standard deviation, *Student's t-test* of the means. **Bold** indicates statistical significance (α=0.10).

Contrasting the mean stature estimates, by sex, from Ban Chiang (BC) and Non Nok Tha (NNT) with the large series from Khok Phanom Di (KPD), shows homogeneity in the female means (Figure 6.5). No statistically significant difference is found between either the Ban Chiang or Non Nok Tha female mean stature and the Khok Phanom Di mean of 154.3 mm (t=0.1942, df=57; t=0.96, df=65 respectively). Male mean statures are consistent in the Northeastern Thailand series, but are much lower in the Khok Phanom Di sample, a difference which is statistically significant (t=3.006, df=57; t=2.867, df=60 respectively).

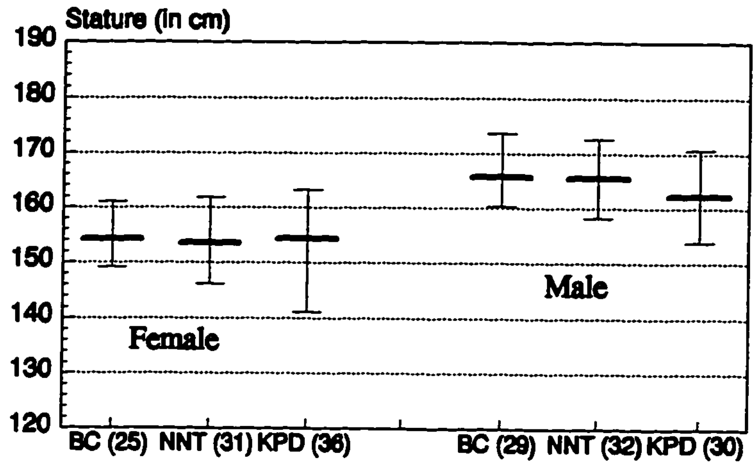


Figure 6.6. Mean Stature Estimates in Thai Skeletal Series

Examining change over time in mean stature estimates in the Northeastern Thailand sites (Table 6.5), shows the only statistically significant differences are in the Early Group female means, where Ban Chiang mean stature is greater. Mean stature estimates in both sexes are consistent over time in the Ban Chiang series. At Non Nok Tha, in contrast, there is a statistically significant increase in mean stature in females in the Late Group. Examining the table closely reveals that in both sexes, the Non Nok Tha Late Group mean stature closely resembles that found in the Early Group at Ban Chiang. The increase in female mean stature in the Non Nok Tha sample over time may reflect a greater protein/calorie intake, perhaps consistent with more domesticated meat or starch.

Table 6.5. Temporal Change in Mean Stature Estimates in Northeastern Thai Adults

Group Sex/Site		Early Group				Late Group			
		n	Mean	SD	Test	n	Mean	SD	Test
Male	Ban Chiang	12	166.0	3.6	t=1.2038 p=0.2399	17	165.4	3.7	t=-0.4277 p=0.6717
	Non Nok Tha	15	164.7	2.4		17	166.0	4.2	
Female	Ban Chiang	9	154.7	2.0	**t=2.220†** **p=0.066**	16	153.7	3.4	t=-1.0363 p=0.3086
	Non Nok Tha	16	152.0	3.9		15	155.0	3.7	

Note: Thai-Chinese formulae (Sangvichien et al. 1985, nd), n=number, SD=standard deviation, t=*Student's t-test* of the means. † Variances are not equal, t statistic based on unequal variances. **Bold** indicates statistical significance (α=0.10).

Femoral and Tibial Lengths

Since there is significant error introduced in the estimation of stature, as well as the use of estimates based on a variety of skeletal elements, it is wise to examine the mean leg long limb bone lengths for possible differences. One measurement per person for each of the two skeletal elements is used for these statistics, the left side is selected when both sides are present, and the right is used in the absence of the left (Table 6.6). There are no statistically significant differences in the mean femoral and tibial lengths between the two northeast sites, both sexes demonstrating remarkable homogeneity given the small number of long limb bones measured.

Table 6.6. Mean Femoral and Tibial Lengths (in mm) in the Ban Chiang and Non Nok Tha Adults

Limb Bone Site	Male				Female			
	n	Mean	SD	Test	n	Mean	SD	Test
Femur Length								
Ban Chiang*	11	443.3	11.9	*t*=0.4019 *p*=0.6912	9	407.0	11.1	*t*=-0.1127 *p*=0.9113
Non Nok Tha	16	441.7	8.6		14	407.7	16.7	
Tibia Length								
Ban Chiang	15	376.7	13.3	*t*=0.3135 *p*=0.7562	13	346.2	9.3	*t*=0.3229 *p*=0.7497
Non Nok Tha	15	375.1	15.7		12	347.8	13.9	

* Burial 2-79A (femur length 495) removed from sample to satisfy assumption of equal variance. Note: SD=standard deviation, *Student's t-test* of the means (α=0.10). **Bold** indicates statistical significance (α=0.10).

Examination of the tibial lengths (Figure 6.7) reveals an homogeneous mean length in females among the three samples, although the Khok Phanom Di range is greater, as would be expected in a larger sample. In males though, the Khok Phanom Di mean is significantly lower than those found in the other samples. The presence of the mean bar at the lower end

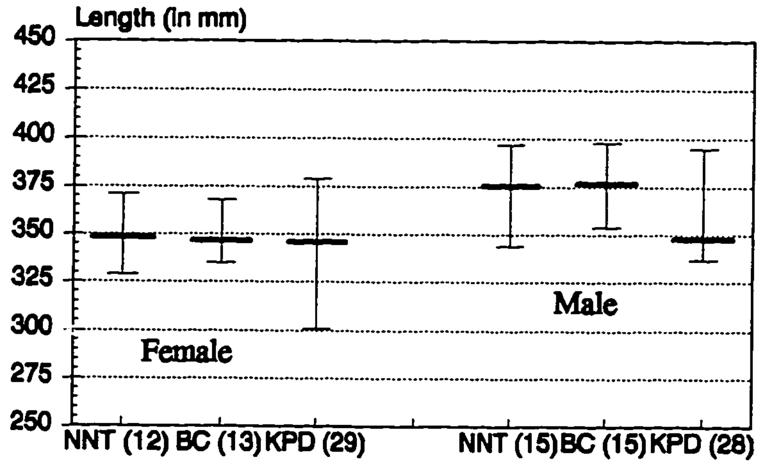


Figure 6.7. Tibial Length in Thai Skeletal Series

of the range distribution suggests the maximum measurement is an outlier. For all practical purposes, the mean tibial length in Khok Phanom Di females (345.7 mm) is identical to that in males (347.6 mm).

Contrasting the mean femoral lengths from the northeastThailand samples and the coastal sample from Khok Phanom Di (Figure 6.8) follows the pattern established by the stature comparisons. The presence of the female mean at the bottom of the Khok Phanom Di range distribution of femoral lengths suggests the longest length is an outlier, a similar observation is noted in the Ban Chiang male sample.

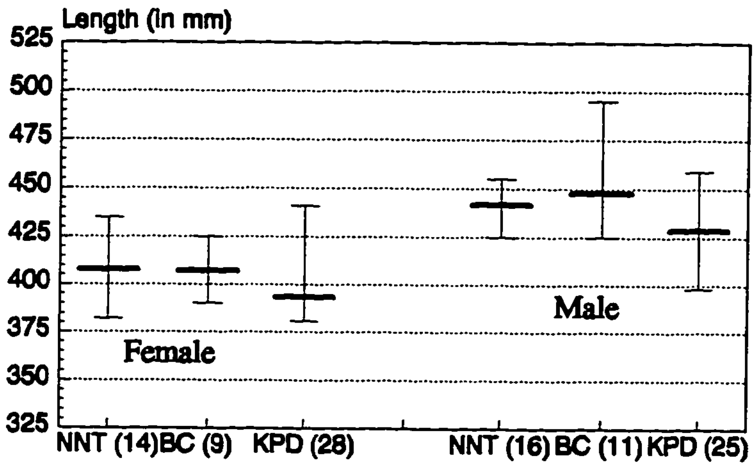


Figure 6.8. Femoral Length in Thai Skeletal Series

When the femoral and tibial length data are subdivided into group samples, the numbers become very small, reflected in the larger standard deviations (Table 6.7). Although there is a slight decline in mean length of the femur in both sexes, and a slight increase in the mean length of the tibia over time at Ban Chiang, the differences are not statistically significant. In the Non Nok Tha sample, on the other hand, both sexes demonstrate increases in mean femur and tibia length over time. In the Non Nok Tha females, the mean tibiae length is less than that in the Ban Chiang Early Group, but by the later phases, the mean has surpassed that noted at Ban Chiang. The increase in female mean tibia length is statistically significant, an increase which is likely reflected in the increase in female mean stature.

Table 6.7. Mean Long Limb Bone Lengths (in mm) in the Ban Chiang and Non Nok Tha Adults

Site Sex/Bone Length	Early Group				Late Group			
	n	Mean	SD	Test	n	Mean	SD	Test
Male Femur								
Ban Chiang	9	448.4	20.2	1.3402 p=0.2088*	3	445.0	17.3	t=-0.0544 p=0.9579
Non Nok Tha	9	438.8	7.9		7	445.4	8.6	
Tibia								
Ban Chiang	8	373.3	11.4	t=0.0775 p=0.9395	7	380.7	15.1	t=0.5202 p=0.6111
Non Nok Tha	6	372.7	16.9		9	376.7	15.7	
Female Femur								
Ban Chiang	4	412.3	11.2	t=0.4122 p=0.6926	5	402.8	10.1	t=0.9246 p=0.3750
Non Nok Tha	5	407.4	21.1		8	409.9	15.0	
Tibia								
Ban Chiang	6	345.7	6.1	t=0.7379 p=0.4760	7	346.7	11.9	t=-1.5606 p=0.1497
Non Nok Tha	7	341.3	13.3		5	356.8	9.6	

Note: n=number, SD=standard deviation, *Student's t-test* of the means. * Variances are unequal. **Bold** indicates statistical significance (α=0.10).

The predicted decline in adult stature with increasing sedentism and stressors is not apparent in the Ban Chiang and Non Nok Tha skeletal samples. Ban Chiang male and female mean estimated stature, and mean femoral and tibial lengths remain stable over time. At Non Nok Tha, in contrast, there is an increase in mean female stature and tibial length in the Late

Group. The increase in female stature at Non Nok Tha implies either a relaxation of the sex-specific stressors, or a preferential access to more protein/calories during growth and development, which was in force during the later phases of occupation of the site.

DENTAL ENAMEL HYPOPLASIA

Dental enamel hypoplasias of all types are recorded in 10.1% (96/947) of the Ban Chiang adult teeth. The prevalence is slightly less in the Non Nok Tha adult sample, present in 7.9% (87/1095) of all teeth examined. Examining the age-at-occurrence of all measured hypoplasias on all permanent teeth (Figure 6.9), suggests that defects in the Non Nok Tha sample are spread over more age intervals than at Ban Chiang. The highest peak in the Non

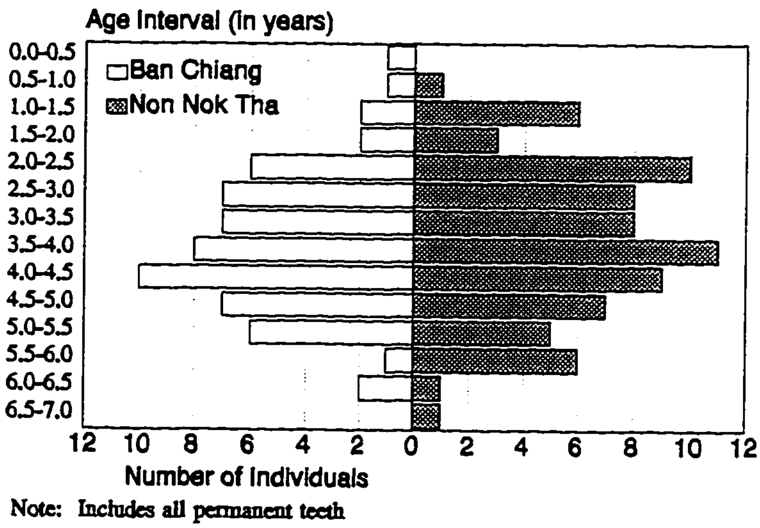


Table 6.9. Enamel Hypoplasias in Northeastern Thailand

Nok Tha sample occurs in the 3.5-4.0 age interval, in contrast to the peak in the Ban Chiang distribution at age 4.0-4.5 years. Focusing only on the presence of hypoplasias of the canines, the mean age-at-occurrence in the Ban Chiang sample suggests maximum stress at age 4.16

years (SD=0.93), while in the Non Nok Tha sample of canines, the mean age-at-occurrence is slightly higher 4.48 years (SD=0.58). The difference however is not statistically significant (t=1.499, df=51). As a comparison, LEH hypoplasia in 44 Harappan canine teeth had a mean age-at-occurrence of 4.29 years (Lukacs 1991).

Comparing the most common hypoplastic defect, linear enamel hypoplasia (LEH), in all permanent teeth (adults and subadults) at Non Nok Tha and Ban Chiang (Table 6.8), it is evident that Ban Chiang teeth are affected more often than Non Nok Tha teeth. There are no statistically significant differences in the frequency in the maxillary teeth, but in the mandible, and the total tooth sample, the differences are significant, especially in the canines and incisors.

Table 6.8. Prevalence of Linear Enamel Hypoplasia (LEH) in Permanent Teeth By Site

Jaw/Tooth Socket	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	6/176	3.4	14/233	6.0	χ^2=1.457	0.227
Premolars	8/142	3.4	10/166	5.9	χ^2=0.021	0.884
Canines	11/65	16.9	6/70	8.6	χ^2=2.136	0.144
Incisors	19/110	17.3	14/104	13.5	χ^2=0.595	0.440
Total Maxillary LEH	44/493	8.9	44/573	7.7	χ^2=0.543	0.461
Mandible Molars	4/203	2.0	4/258	1.6	FET	0.736
Premolars	1/156	0.6	4/159	2.5	FET	0.371
Canines	**19/77**	**24.7**	**5/85**	**5.9**	**χ^2=11.306**	**0.001**
Incisors	7/114	6.1	5/93	5.4	χ^2=0.055	0.815
Total Mandibular LEH	**31/550**	**5.6**	**18/595**	**3.0**	**χ^2=4.757**	**0.029**
All Molars	10/379	2.6	18/491	3.7	χ^2=0.725	0.395
All Premolars	9/298	3.0	14/325	4.3	χ^2=0.725	0.395
All Canines	**30/142**	**21.1**	**11/155**	**7.1**	**χ^2=12.259**	**0.000**
All Incisors	26/224	11.6	19/197	9.6	χ^2=0.423	0.516
Total LEH	**75/1043**	**7.2**	**62/1168**	**5.3**	**χ^2=3.360**	**0.067**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 74 individuals from Ban Chiang; and 90 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Dental enamel hypoplasia was assessed in a similar manner in the Khok Phanom Di sample, although a selected sub-sample of the more complete dentitions (more than 10 teeth) was used. LEH defects were most common in the canines and incisors, more common in females than males, and showed the highest prevalence at ages three to four (calculated mean-age-at-occurrence in adult canines is 3.157 years), nearly one year younger than the Northeastern Thai samples. The overall prevalence of LEH in permanent teeth in adults (223/455, 49.0%) and subadults (9/186, 4.8%) at Khok Phanom Di is 36.2%, much higher than either of the two Northeastern Thai samples. Obviously, enamel defects were quite common, noted in 87% of adult individuals surveyed. This is in contrast to 20.2% (16/79) of adults at Non Nok Tha, and 39.4% (26/66) of adults at Ban Chiang.

Examining the prevalence of LEH over time in the Northeastern Thailand samples (Table 6.9) suggests a fairly consistent frequency, except in the Late Group at Non Nok Tha. Although there is variation in the prevalence by tooth class between the two sites, the overall prevalence is remarkably similar. The large decline in the Late Group sample at Non Nok Tha seems anomalous. The dental sample appears adequate, and there is a corresponding decline in all of the tooth classes, including those most susceptible to defects (incisor and canine), suggesting consistency across the dental sample. The low prevalence of LEH may reflect either a decline in stressors, a decrease in susceptibility to the stressors, or an increase in stressors resulting in early death.

Table 6.9. LEH Prevalence By Group and Site in Adult Permanent Teeth

Jaw/Tooth Socket		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Early Group	Molars	**0/191**	**0.0**	**13/272**	**4.8**	χ^2**=9.392**	**0.002**
	Premolars	4/154	2.6	11/175	6.3	χ^2=2.561	0.110
	Canines	**18/78**	**23.1**	**7/88**	**8.0**	χ^2**=7.392**	**0.007**
	Incisors	18/112	16.1	11/87	12.6	χ^2=0.462	0.497
Total Early Group LEH		40/535	7.5	42/622	6.8	χ^2=0.229	0.632
Late Group	Molars	10/188	5.3	5/209	2.4	χ^2=2.332	0.127
	Premolars	5/144	3.5	3/141	2.1	FET	0.723
	Canines	**12/64**	**18.8**	**4/64**	**6.3**	χ^2**=4.571**	**0.033**
	Incisors	8/112	7.1	8/107	7.5	χ^2=0.009	0.924
Total Late Group LEH		**35/508**	**6.9**	**20/521**	**3.8**	χ^2**=4.732**	**0.030**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 62 individuals from Ban Chiang; and 78 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Examining the distribution of age-at-occurrence of all measured defects in the permanent teeth, by group, in the Non Nok Tha and Ban Chiang samples (Figure 6.10), documents a trend toward later age-at-occurrence in the Late Group at Ban Chiang. The highest frequency of defects occurs at age 2.5-3.5 in the Early Group, and age 3.5-4.0 in the Late Group. In the Non Nok Tha sample, there is an apparent trend toward an earlier age-at-

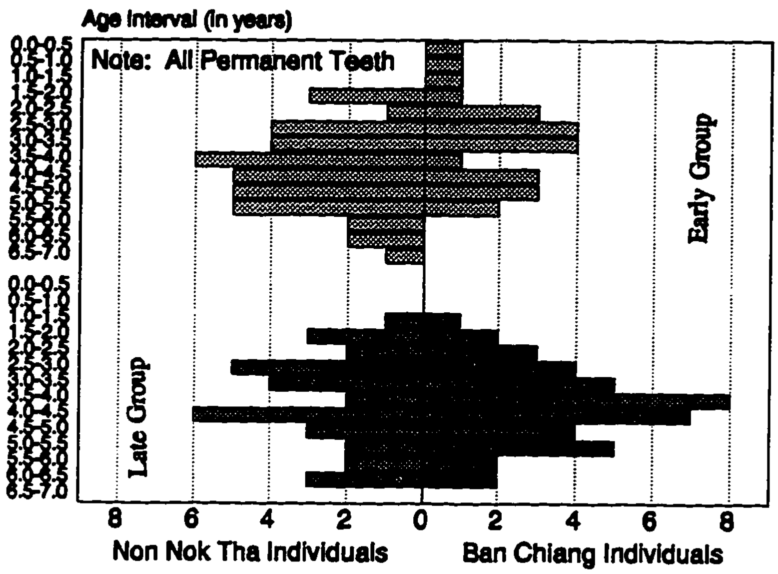


Figure 6.10. Temporal Change in Hypoplasia Age

occurrence in the Late Group, but the distribution is more erratic. The peak in the Early Group at 3.5-4.0 years is similar to the Ban Chiang Late Group, while the two peaks in the Non Nok Tha Late Group occur at age 2.5-3.0 and then age 4.0-4.5.

In both of these sites, in both groups, defects are rare prior to the age of two years, an observation not uncommon in dental hypoplasia analysis and which may be related to the incisal edge being less susceptible, loss of this region due to wear, lack of stressors in early infancy, presence of maternal antibody protection, and/or early death (e.g. Wood 1996, Goodman and Rose 1990). While the notion that the peak occurrence of hypoplastic defects reflects the age-at-weaning has been tested and found wanting (Blakey et al. 1994, Wood 1996), a more plausible explanation is the influence of disease (intestinal parasites, malaria, diarrhea) to which active immunity is not yet developed. In addition, a toddler has greater mobility and as a result more contact and exposure to a variety of environmental stressors.

The low prevalence of all dental enamel hypoplasias in the Ban Chiang and Non Nok Tha series is suggestive of general "health", and especially with respect to the frequencies encountered in the Khok Phanom Di skeletal series. Age-at-occurrence estimates show defects are rare prior to age two years, with a temporal trend toward older age-at-occurrence in both the northeastern Thailand sites. Over time, linear enamel hypoplasia frequencies hover around 7.0% of all teeth, except for an enigmatic decline in the Late Group at Non Nok. This stability, and the relative low frequencies of affected teeth and individuals over time, are in opposition to the predicted increase in this non-specific stress indicator.

INDICATORS OF ANEMIA

The presence of cribra orbitalia and porotic hyperostosis is suggested to represent the occurrence of iron deficiency anemia in childhood (Stuart-Macadam 1987a). Because of the wide variety of prevalences, the cause of the disorder must be multifactorial and include the presence of infectious disease and parasites, as well as possible dietary factors (Mensforth et al. 1978, Stuart-Macadam 1992). The early inhabitants of northeast Thailand are likely to have had intestinal parasites, and might also have been affected with malaria and/or genetic anemias, all of which contribute to iron deficiency anemia and its sequelae (Brothwell 1991, Picot and Benoist 1975). The relative iron deficiency anemia which is part of the physiological response to infection, is not likely to foster an hematopoietic reaction in the skeleton since it is a shift of iron rather than a complete lack of iron.

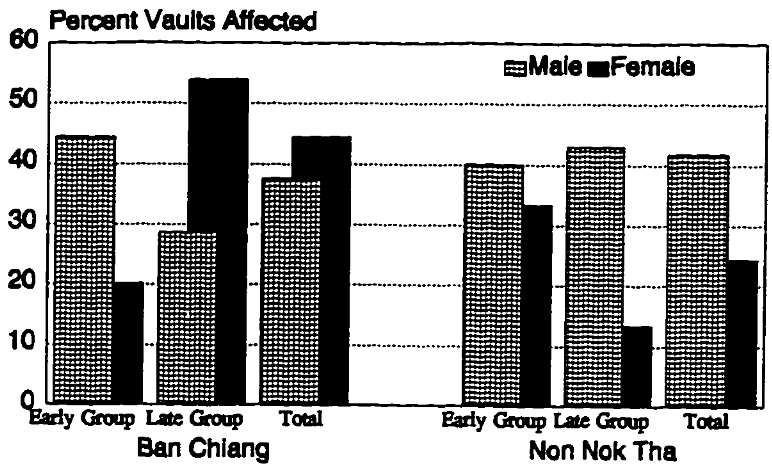


Figure 6.11. Porotic Hyperostosis of the Adult Vault

If a hypothesis is made that people in non-malarial areas such as the Amerindians, and those in malarial areas are equally infected with intestinal parasites, then one might expect a higher frequency of the indicators of iron deficiency anemia in the latter population (given equality in other factors such as diet, infectious disease, etc.). However, the complex interaction between iron deficiency and infection makes it unlikely to be a one-to-one relationship (Masawe et al. 1974, Weinberg 1992). In examining these indicators of iron deficiency anemia in the two Northeastern Thailand populations, brief reference to the Khok Phanom Di data will be made for perspective (Tayles 1992). The primary indicator of iron deficiency anemia in skeletal populations is the presence of porotic hyperostosis of the cranial vault and the related cribra orbitalia of the orbits.

Porotic Hyperostosis of the Vault

All of the porotic hyperostosis of the cranial vault in adults from Ban Chiang and Non Nok Tha was noted on the superior regions of the frontal, parietal and occipital bones. None of the vaults exhibited a thickened surface raised above the level of the cortex, rather there was a porosis or pitting of the outer cortex. This pitting is described as either fine (< 0.05 mm diameter) or coarse (> 0.05 mm) and gives the vault an "orange peel" texture (Mann and Murphy 1990). Typically, the finer lesions were pits rather than holes, while the larger lesions perforated the outer table to the diplöe, there usually was not coalescence of the lesions in these remains. Although cranial vault radiographs were taken of all reasonably intact crania or calvaria, the results were less than satisfactory. Partial mineralization of the bones, intrusive radio-opaque material, and the incomplete nature of the specimens, made it difficult to obtain a good view of the cortical layers with identifying landmarks. Hence, no measurements were made on the radiographs and little emphasis is accorded them here.

More of the observed adult cranial vaults from Ban Chiang (41.2%, 14/34) are affected with porosis (of any kind) than at Non Nok Tha (33.3%, 23/69), a difference which is not statistically significant (χ^2=0.6087). The pattern of occurrence by sex is quite different at each site (Figure 6.11), as is the change in prevalence over time. Ban Chiang cranial vault porosis is more common in females (44.4%) than males, while Non Nok Tha male vaults (41.7%) are more often affected than females. The prevalence of vault porosis in the Early Group at Ban Chiang (5/14, 35.7%) is nearly identical to that in the Early Group at Non Nok Tha (36.4%, 12/33). In contrast, the Ban Chiang Late Group vault porosis (45.0%, 9/20) is much higher than at Non Nok Tha (30.6%, 11/36), but which is not significant (χ^2=1.168, p=0.280). No correlation between porotic hyperostosis and cribra orbitalia was evident in either of the sites. Cranial vault porosis was noted in two subadult crania at Ban Chiang (2/17, 11.8%), while in the Non Nok Tha subadult cranial material, one individual, aged two to four years, was affected (1/21, 4.8%).

Nearly all of the cranial material in the Khok Phanom Di series was heavily encrusted with calcareous deposits which resisted cleaning efforts and restricted observation of the outer cortex of the vault (Tayles 1992). Only one individual, an 18 year old male, was noted to have "porous reactive bone" on the right parietal.

Cribra Orbitalia

Cribra orbitalia is uncommon in both northeastern Thai samples under discussion (Table 6.10), occurring more frequently in the Ban Chiang sample than at Non Nok Tha. At both sites, cribra orbitalia is more frequent in adult females than in adult males, a difference which is also evident in the subadults, and in the temporal sub-samples. Interestingly, none of the 17 subadults from Non Nok Tha is affected with cribra orbitalia.

In the Khok Phanom Di skeletal series, cribra orbitalia is noted in 54.4% of adult individuals (31/57), with no statistically significant sex differences. Three-quarters of the subadults, aged one to 12, are affected (10/13, 76.9%). This gives a combined prevalence of

Table 6.10. Cribra Orbitalia Prevalence in Ban Chiang and Non Nok Tha Adults and Subadults

Site A/O %	Cribra Orbitalia in Adults				
	Ban Chiang		Non Nok Tha		Statistic
Orbits*	7/46	15.2	13/99	13.1	χ^2=0.115 p=0.735
Individuals	6/32	18.8	7/59	11.9	FET p=0.370
Site A/O %	Cribra Oribitalia in Adults and Subadults				
	Ban Chiang		Non Nok Tha		Test
Orbits*	**17/69**	**24.6**	**13/116**	**11.2**	**χ^2=5.977 p=0.014**
Individuals	**12/47**	**25.5**	**7/70**	**10.0**	**χ^2=4.987 p=0.026**

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). *Right and left sides combined. **Bold** indicates statistical significance (α=0.10).

58.6% (41/70), nearly twice as high as the Ban Chiang sample (25.5%) and more than four times the frequency in the Non Nok Tha series.

The change in frequency of cribra orbitalia over time in the northeastern Thai sites is different at each location (Table 6.11). At Ban Chiang, there is a slight increase in frequency in both adults and subadults in the Late Group (not statistically significant). On the other hand, cribra orbitalia in the Non Nok Tha sample declines in the Late Group. In the two Early Group samples, there is no statistically significant difference in the frequency of cribra orbitalia, but, there are statistically significant differences in the Late Groups. It is worthy of note that there is a consistent increase in the frequency of cribra orbitalia over time when the Late Group at Non Nok Tha is omitted, moving from 15.0% to 20.0% and finally 31.8% of individuals in the Late Group at Ban Chiang. The complete absence of cribra orbitalia in all of the subadults, and the very low frequency in the Late Group at Non Nok Tha is enigmatic. The somewhat smaller sample size may be contributing sampling error or individuals may be less susceptible to the stress, perhaps because of a change in the status of burials in the Late Group at the site.

Table 6.11. Cribra Orbitalia Prevalence, By Site and Group, in Adults and Subadults

Site A/O %		Cribra Oribitalia in Adults and Subadults				
		Ban Chiang		Non Nok Tha		Test
Orbits*	Early Group	8/36	22.2	11/70†	15.7	χ^2=0.684 p=0.408
	Late Group	9/32	28.1	2/43	4.4	**FET=0.006**
Individuals	Early Group	5/25	20.0	6/40	15.0	FET=0.737
	Late Group	7/22	31.8	1/29	3.5	**FET=0.015**

Note: A=affected, O=observed, FET=Fisher's Exact Test (two-tailed probabilities). **Bold** indicates statistical significance (α=0.10). * Right and left sides combined. † When adults only are compared, the frequency of cribra orbitalia per orbit in the Non Nok Tha Early Group sample (11/55, 20.0%) is significantly greater than that at Ban Chiang (1/25, 4.0%).

Cranial Vault Thickness

Although not proximate to the cause of increased marrow capacity in the cranial vault, the "thickness" of the vault may provide an indirect indication of the presence of iron deficiency anemia. At Ban Chiang, the mean cranial vault thickness measures were larger in females than in males, while at Non Nok Tha, there was no difference in the mean thickness by sex. This difference may be explained by the small size of the Ban Chiang sample. The range of vault thickness (4 mm - 13 mm) is similar at both sites, with the maximum thickness typically noted at the asterion, lambda, etc. in males. Comparing the mean measurements, sexes combined, between the two sites (Table 6.12), shows no statistically significant differences.

Table 6.12. Comparison of Mean Cranial Vault Thickness Measurements (in mm) in Adults*

Measurement Point	Ban Chiang			Non Nok Tha			*Student's t*	
	Mean	SD	Range	Mean	SD	Range	*df*	*t*
R frontal	6.4	1.2	4-9	6.1	1.5	4-9	85	0.7381
L frontal	6.2	1.2	4-9	6.3	1.3	4-10	93	0.1078
Mid-frontal	7.1	1.6	4-11	6.7	1.6	4-12	94	1.0780
Bregma	6.9	2.0	4-13	6.8	1.7	4-11	104	0.3041
Obelion	7.3	2.0	4-13	7.2	1.7	4-11	95	0.3649
R parietal	6.7	1.6	4-10	6.9	1.5	4-11	105	0.4561
L parietal	6.9	1.6	4-11	6.9	1.5	4-11	96	0.2239
R asterion	6.4	1.5	4-10	6.3	1.6	4-10	83	0.2574
L asterion	6.4	1.7	4-11	6.3	1.7	4-12	74	0.0679
Lambda	7.8	2.1	5-13	8.1	1.8	4-12	96	0.7605
# crania	50			82				

* Sexes combined. Note: R=right, L=left, #=number, SD=standard deviation. **Bold** indicates statistical significance (α=0.10).

Although external vault measurements were not made on the Khok Phanom Di crania (Tayles 1992:169), measurements at the vertex (highest point), bregma, and mid-frontal were taken from radiographs. Measurements recorded in 29 individuals (18 females, 11 males) give a mean at the frontal of 7.68 and 7.45; bregma 6.91 and 8.67; and vertex 7.47 and 9.00 (female and male means respectively, in mm). No significant sex difference is found in the mid-frontal, but male vaults are thicker than female vaults at the other two points. These measurements fit well within the data presented here.

In an analysis of Neolithic Jomon, a statistically significant decline in thickness was noted between the ancient and modern Japanese (Ishida and Dodo 1990). Mean measurements, taken at the frontal eminence, bregma and parietal eminence, on the Jomon crania fall well within the ranges noted in the Ban Chiang and Non Nok Tha samples. Vault measurements range from 5.1 mm - 8.8 mm in males, and 5.6 - 8.0 mm in females.

Table 6.13. Temporal Change in Mean Cranial Vault Thickness Measurements (in mm) in Adults

Measurement Point	Early Group		Late Group		*Student's t*	
	Mean	SD	Mean	SD	*df*	*t*
Frontal*	6.43	1.43	5.95	1.13	**96.9**	**1.9037†**
Mid-frontal	6.80	1.60	6.96	1.57	91	0.4652
Bregma	7.04	1.81	6.80	1.71	102	0.6957
Obelion	7.34	2.07	7.10	1.56	85.6	0.6277†
Parietal*	7.05	1.52	6.52	1.46	**117**	**1.884**
Asterion*	6.26	1.48	6.42	1.73	97	0.4965
Lambda	8.17	1.94	7.84	1.87	94	0.8571
Zygoma*	6.03	1.61	6.01	1.85	76	0.0525

* One measurement per person, mean of two sides if available. † Variances are not equal, *t* statistic based on unequal variances. **Bold** indicates statistical significance (α=0.10).

Although there is a decline in mean vault thickness in Non Nok Tha males over time, neither site demonstrated statistically significant changes in cranial vault thickness by group. Combining the two samples and examining change over time (Table 6.13), though, demonstrates a significant decline in the mid-frontal and parietal eminence thickness measures in the Late Group. When only those individuals with thickness measurements greater than one standard deviation above the sex-specific mean are selected, there are more individuals in the Late Group at Ban Chiang, and at Non Nok Tha more individuals are in the Early Group.

Data collected on the diplöe:compact components of the cranial vault (only from Non Nok Tha) documented no occurrences of a ratio suggestive of clinical anemia, and the largest ratios are noted in subadult crania. There is a decline in diplöe thickness in the Late Group, a finding consistent with the decline in overall vault thickness.

Enlarged Nutrient Foramina

Enlarged nutrient foramina in any skeletal element are indicative of an increased blood supply. There appears to be evidence of a predilection for enlarged foramina of the phalanges in thalassemia (Lawson et al. 1984), but enlarged foramina in any element, in the absence of signs of infection, might suggest an hematopoietic response (Resnick, personal communication). Although the prevalence of enlarged nutrient foramina of the metatarsals is higher in the Ban Chiang skeletal series than in the Non Nok Tha series, there is no statistically significant difference between the two sites (Table 6.14). At Ban Chiang right metatarsals are affected more often than left, and females more often than males, but these differences did not occur in the larger sample from Non Nok Tha.

Table 6.14. Enlarged Nutrient Foramina of the Metatarsals in Northeastern Thailand

A/O	Ban Chiang		Non Nok Tha		Statistic
Metatarsals	9/349	2.6	7/378	1.9	χ^2=0.4455
Individuals	7/65	10.8	4/73	5.5	χ^2=1.3116

Note: Includes adults and subadults. Frequency in all five metatarsals and individuals with at least one metatarsal. A=affected, O=observed. **Bold** indicates statistical significance (α=0.10).

Table 6.15. Temporal Changes in Frequency of Enlarged Nutrient Foramina

Group		Ban Chiang		Non Nok Tha		Statistic
Metatarsals	Early	7/172	4.1	5/158	3.2	χ^2=0.193 p=0.661
	Late	2/177	1.1	2/220	0.9	FET 1.000
Individuals	Early	**6/29**	**20.7**	**2/35**	**5.7**	**FET 0.040**
	Late	1/36	2.8	2/37	5.4	FET 1.000

Note: Includes both adults and subadults. Frequency in all five metatarsals and individuals with at least one metatarsal. A=affected, O=observed, FET=Fisher's Exact Test (two tailed probabilities. **Bold** indicates statistical significance (α=0.10).

At both sites, the enlarged foramina occur in individuals from the earlier phases of occupation (Table 6.15), and clearly demonstrate a decline over time. In the Early Groups, the frequency at Ban Chiang is significantly greater than at Non Nok Tha, a difference which disappears in the Late Groups. In the Khok Phanom Di sample, enlarged foramina of the phalanges, metacarpals and metatarsals are noted in both adults and subadults. However, no frequency data are reported (Tayles 1992).

Anemia is present in both of these northeastern Thai skeletal series, but the frequencies of the primary indicators (porotic hyperostosis and cribra orbitalia) are relatively low, especially in contrast to Khok Phanom Di. There are suggestions of the presence of a genetic anemia (i.e. subadult cranial vault porosis, diplöe:cortex ratios which near the proposed threshold of clinical anemia), but the differentiation of these findings from the effects of endemic or epidemic malaria is not clear. An unexpected temporal trend is seen, with a general decline in prevalence of the indicators of anemia over time. Cranial vault thickness and the frequency of enlarged nutrient foramina decline in the Late Group at both sites. While there is no significant change in cranial vault porosis at Ban Chiang over time, there is a decline in frequency in the Non Nok Tha sample. Cribra orbitalia shows an increase in frequency over time in the Ban Chiang series and a decline at Non Nok Tha. These inconsistent findings may be the result of small sample sizes; excavation, preservation or mortality bias, or may represent the influence of blood polymorphisms on one of the causes of anemia.

DECIDUOUS DENTAL HEALTH

Deciduous dentitions are often overlooked in favor of the better preserved and more numerous teeth of the adult skeleton; as a result, there is little comparative data on dental pathology in deciduous dentitions. Although there is little dental pathology at either site, the deciduous dental samples from Ban Chiang (27 burials, 263 teeth) and Non Nok Tha (32 burials, 260 teeth) provide important information on dental pathology in the subadults (Table 6.16).

Most of the caries (7/9) in the Ban Chiang dental sample are attributable to hypoplastic enamel defects, while one of the three caries in the Non Nok Tha series is possibly due to hypoplastic enamel. The majority of the dental enamel hypoplasias in the deciduous teeth at both sites are localized hypoplasia of the primary canine (LHPC), affecting 5/16 (31.3%) subadults at Ban Chiang and 5/18 (27.8%) Non Nok Tha subadults. Only the prevalence of slight calculus is significantly different between the two sites: greater in the Ban Chiang sample than at Non Nok Tha, which contains older individuals.

Table 6.16. Deciduous Dental Pathology in the Ban Chiang and Non Nok Tha Subadults

Pathology		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Caries	Present	9/210	4.3	5/209	2.4	χ^2=1.163	0.281
LHPC	Canine Teeth	9/41	22.0	6/46	13.0	FET	0.395
LEH	All teeth	5/226	2.2	3/212	1.4	FET	0.725
Calculus	Slight	**38/189**	**20.1**	**16/182**	**8.8**	**χ^2=9.544**	**0.002**
Attrition	Advanced*	58/209	27.8	61/207	29.5	χ^2=0.150	0.698
Abscesses		0/189	0.0	0/235	0.0		

Note: A=affected, O=observed, LHPC=localized hypoplasia of the primary canine, LEH=linear enamel hypoplasia, FET=Fisher's Exact Test (two-tailed probability). *Attrition includes dentin and pulp exposure. **Bold** indicates statistical significance (α=0.10).

To assist in interpreting the prevalence of deciduous dental pathologies in the northeastern Thai samples, selected comparative data are presented. In the Khok Phanom Di skeletal series from Thailand, Tayles (1992) reports caries in 6.0% (11/178) of the deciduous teeth; or 33.0% of individuals (6/18). Sciulli (1990) surveyed the deciduous teeth in an Amerindian population from Ohio of the terminal late Archaic (3000 BP). In 414 deciduous teeth there are no abscesses, no teeth lost premortem, no observations of linear enamel hypoplasia, and six caries (1.4%). None of the caries found occurs on the canine teeth, suggesting the absence of LHPC in this population, although this is only an inference.

Larsen et al. (1991) group samples of deciduous teeth from Georgia by agricultural level. In these groups there is an increase in caries from none (0/180) in a pre-agricultural sample, to 7.1% (23/323) in precontact agricultural populations, and finally peaking at 16.2% (51/314) in the postcontact series.

Skinner and Hung (1989) in attempting to delineate LHPC correlates in a sample of living children found affected teeth in 2.4% of children observed (33/1350), substantially less than the frequencies seen in the Ban Chiang and Non Nok Tha skeletal series. Lukacs (1991), also using living children in Pakistan, found no statistically significant sex, socioeconomic, or stature differences. Defects occurred more often in the mandible than maxilla, with no significant side difference, and asymmetric defects were twice as common as symmetric ones. LHPC was seen in 14.6% of the canine teeth in 113 children, with a mean number of affected teeth per affected person of 1.6 (SD=0.75).

In the Khok Phanom Di series, hypoplasias of all kinds are noted in 11/18 (61.1%) of subadults, and in 20.0% of deciduous teeth (39/200). Interpreting "discrete non-linear defects" as LHPC, these defects occur in 14/200 teeth (7.0%), and 39.0% of individuals (7/18). The "per person" prevalence of LHPC in the Ban Chiang and Non Nok Tha is comparable to that noted at Khok Phanom Di, and suggests that if low maternal calcium is a predisposing factor, it is geographically and perhaps temporally consistent.

Table 6.17. Deciduous Dental Pathology, By Group, in Ban Chiang and Non Nok Tha Subadults

Group Pathology	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Early Group						
Caries present	4/115	3.5	3/131	2.3	FET	0.709
LHPC canines	5/25	20.0	2/29	6.9	FET	0.229
Calculus slight	29/108	26.9	7/110	6.4	**χ^2=16.592**	**0.000**
Attrition advanced*	39/117	33.3	30/129	23.3	**χ^2=3.087**	**0.079**
Late Group						
Caries present	5/95	5.3	2/78	2.6	FET	0.460
LHPC canines	4/16	25.0	4/17	23.5	FET	1.000
Calculus slight	9/81	11.1	9/72	12.5	χ^2=0.071	0.790
Attrition advanced*	19/92	20.7	31/78	39.7	**χ^2=7.411**	**0.006**

Note: A=affected, O=observed, LHPC=localized hypoplasia of the primary canine, FET=Fisher's Exact Test (two-tailed probability). *Advanced attrition includes dentin and pulp exposure. **Bold** indicates statistical significance (α=0.10).

Contrasting the deciduous dental pathology in the northeastern Thailand samples, by group, shows significant differences in the Early Group in the frequencies of slight calculus and advanced attrition (Table 6.16). Advanced attrition is also significantly different in the Late Group, but the larger frequency occurs in the Non Nok Tha sample rather than the Ban Chiang sample.

Graphic illustration of the temporal changes in deciduous dental pathology over time (Figure 6.12) easily demonstrates the differences between the two sites. Statistically significant group changes within each site are designated by an asterisk. As shown above, statistically significant differences between the sites are noted only in the frequencies of slight calculus and advanced attrition in the Early Group; and advanced attrition in the Late Group samples. Also noteworthy in this graphic is that both groups of the Non Nok Tha pathologies resemble the Early Group at Ban Chiang, showing increasing frequencies of dental pathologies, with the only declines occurring in the Late Group at Ban Chiang.

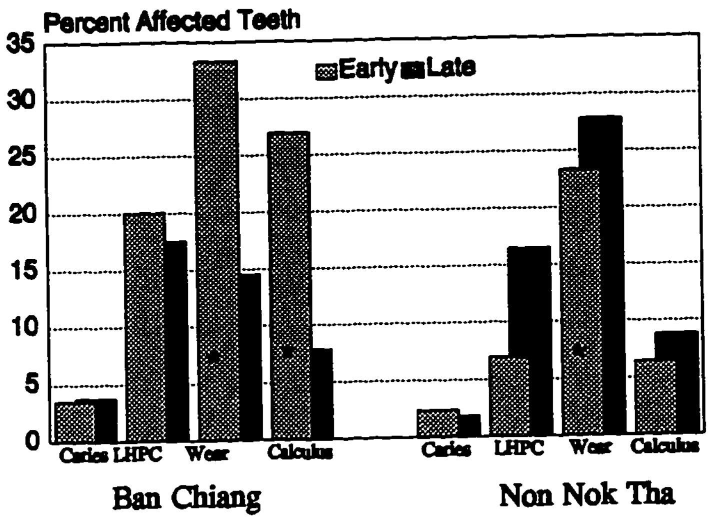


Figure 6.12. Deciduous Dental Pathology Over Time

The "origins of agriculture" model proposes that with increased sedentism and a narrowing of the resource base, comes an increase in dental infectious lesions, and a decline in nutrition reflected in an increase in enamel hypoplasias (other than LHPC). If the LHPC defects are related to maternal calcium levels, then these defects would increase as well, reflecting movement away from a broadly balanced diet and toward high carbohydrates.

Buikstra et al. (1986) have proposed that changes in Amerindian pottery technology created thinner-walled vessels, with improved heat transfer, and therefore improved preparation of a "weaning gruel." This food allowed earlier weaning, and thus increased fertility. Consider the potential effects on the deciduous dentition: increase in caries because of increased carbohydrate diet, started earlier and ingested longer, an increase in LHPC (if it is related to mouthing behaviors) with earlier weaning, and an increase in calculus. Dental attrition seems interpretable in two ways: increased attrition and/or earlier onset of attrition due to earlier weaning; or decreased attrition because of the availability of softer, more processed foodstuffs.

Returning to the graphic (Figure 6.12), in the older age-at-death deciduous tooth sample from NNT, there are no statistically significant temporal changes in caries, LHPC or calculus, although the latter two frequencies increase over time. Tooth wear, exposing the dentin and pulp, increases significantly in the Non Nok Tha Late Group, but still remains less than that seen in the Early Group at Ban Chiang.

In the Ban Chiang sample, as well, there are no statistically significant changes in caries or LHPC over time, although both are greater than seen at Non Nok Tha. However, a dramatic decline in the Late Group frequencies of advanced attrition and calculus, is apparent in the Ban Chiang sample. In the Early Groups at both sites, dentin exposure is evident in the anterior teeth by the mean age of two years. In the Late Group at Non Nok Tha, dentin exposure is not seen until mean age three, and not until mean age four years in the Ban Chiang Late Group sample. The age that slight calculus is first noted in the deciduous teeth follows the same pattern. Thus, the decline in advanced attrition and calculus in the Late Group at Ban Chiang reflects a later age-at-occurrence of dentin exposure, perhaps related to the presence of a softer diet.

ADULT DENTAL HEALTH

The analysis of dental pathologies relative to subsistence systems begun by the collective contributors to *Paleopathology at the Origins of Agriculture* (Cohen and Armelagos 1984) and broadened to changes relative to Western contact (e.g. Larsen and Milner 1994), has established a range of expected variation. This range exhibits a certain "polarity", either positive or negative, relative to changes in subsistence or contact (Lukacs 1989). Caries, dental enamel hypoplasias, dental calculus, and alveolar resorption, all exhibit increasing prevalence with the transition from hunting-gathering to agriculture (positive polarity). In contrast, dental attrition typically declines with the advent of agriculture (negative polarity). Polarity is not established for the prevalence of abscessing or premortem tooth loss, as there does not seem to be a consistent trend in these two pathologies (Lukacs 1989).

Dental pathologies in the permanent teeth of adults, individuals older than 15 years, from Ban Chiang and Non Nok Tha are compared in this section. Since most of the pathologies are absent in permanent teeth in subadults, these teeth will be omitted in this discussion, and the reader is referred to the appropriate sections within each site chapter. As a reminder of the effects of the age distribution on dental pathology, Table 6.18 evaluates the sites by individual as well as teeth. While the young adult and middle-aged categories are fairly similar, it is evident that there are more old-aged individuals at Non Nok Tha.

Table 6.18. Age Distribution of the Adult Permanent Dental Samples

Sex Age Category		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	*p*
Burials	young	18/64	28.1	21/76	27.6	χ^2=4.636	**0.098**
	middle-aged	43/64	67.2	43/76	56.6		
	old	3/64	4.7	12/76	15.8		
Teeth	young	373/1089	34.3	406/1185	34.3	χ^2=46.30	**0.000**
	middle-aged	680/1089	62.4	655/1185	55.3		
	old	36/1089	3.3	124/1185	10.5		

Note: A=affected, O=observed. **Bold** indicates statistical significance (α=0.10).

Premortem Tooth Loss

Comparison of premortem tooth loss in the Ban Chiang and Non Nok Tha dental series (Table 6.19) reveals no statistically significant differences in either the maxilla, mandible, or in the summary tooth class data. Premortem tooth loss is greater in males than in females at both sites. Premortem tooth loss occurs rarely before age 35-40 years, the first occurrence, absenting possible ablation, is at age 25-30 years at Ban Chiang, and 20-25 years at Non Nok Tha.

The frequency of premortem tooth loss recorded in these northeastern Thai samples (6.7% and 7.4%) is slightly lower than that recorded in the Khok Phanom Di skeletal series, 8.9% (183/2047). All three of these prevalences are consistent with the low end of the distribution of premortem tooth loss from pre-agricultural to agricultural populations (e.g. Ecuador 6.0% - 25.4% permanent teeth lost [Ubelaker 1994:152]). In the South Asia bronze age sample from Harappa (Hemphill et al. 1991), a population experiencing agricultural intensification, 8.53% of all teeth were lost premortem (70/821).

Table 6.19. Prevalence of Premortem Tooth Loss in Adult Permanent Teeth, By Site

Jaw/Tooth Class	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	17/225	7.6	20/280	7.1	χ^2=0.031	0.860
Premolars	6/174	3.4	6/225	2.7	χ^2=0.205	0.650
Canines	1/84	1.2	5/105	4.8	FET	0.229
Incisors	4/145	2.8	8/201	4.0	χ^2=0.375	0.540
Total Maxillary Loss	28/628	4.5	39/811	4.8	χ^2=0.098	0.754
Mandible Molars	45/272	16.5	50/334	15.0	χ^2=0.281	0.596
Premolars	8/198	4.0	12/229	5.2	χ^2=0.342	0.558
Canines	2/97	2.1	4/117	3.4	FET	0.691
Incisors	9/170	5.3	20/207	9.7	χ^2=2.508	0.113
Total Mandibular Loss	64/737	8.7	86/887	9.7	χ^2=0.492	0.483
All Molars	62/497	12.5	70/614	11.4	χ^2=0.303	0.582
All Premolars	14/372	3.8	18/454	4.0	χ^2=0.022	0.881
All Canines	3/181	1.7	9/222	4.1	χ^2=1.982	0.159
All Incisors	13/315	4.1	28/408	6.9	χ^2=2.487	0.115
Total Premortem Loss	92/1365	6.7	125/1698	7.4	χ^2=0.444	0.505

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 65 individuals from Ban Chiang; and 82 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

There is no change in the frequency of premortem tooth loss over time in the Ban Chiang sample (Table 6.20). In contrast, the frequency of loss in the Non Nok Tha teeth doubles in the Late Group (5.0% : 10.4%), attributable to an increase in all tooth classes. The Non Nok Tha Late Group is the highest prevalence encountered and is statistically greater than the Ban Chiang frequencies. Although other dental pathologies change significantly over time, premortem tooth loss in Harappan remains exhibits relative stability (Hemphill et al. 1991:149). Lukacs (1989) points out that the cause of premortem tooth loss may be more revealing than the frequency of lost teeth, such as a shift from attrition-related loss to caries-related loss. In these northeastern Thai tooth samples, attrition appears to be the primary cause of tooth loss, with no observable change over time, an observation which is supported by the presence of the majority of tooth loss in older individuals.

Table 6.20. Premortem Tooth Loss By Group and Site in Adult Permanent Tooth Sockets

Jaw/Tooth Socket		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Early Group	Molars	**28/236**	**11.9**	**26/335**	**7.8**	**χ^2=2.722**	**0.099**
	Premolars	5/184	2.7	6/238	2.5	FET	1.000
	Canines	1/90	1.1	3/117	2.6	χ^2=0.567	0.452
	Incisors	10/157	6.4	10/210	4.8	χ^2=0.451	0.502
	Total	44/667	6.6	45/900	5.0	χ^2=1.823	0.177
Late Group	Molars	34/261	13.0	44/267	16.5	χ^2=1.250	0.264
	Premolars	9/188	4.8	12/208	5.8	χ^2=0.190	0.663
	Canines	2/91	2.2	6/101	5.9	FET	0.284
	Incisors	**3/158**	**1.9**	**18/190**	**9.5**	**χ^2=8.729**	**0.003**
	Total	**48/698**	**6.9**	**80/766**	**10.4**	**χ^2=5.824**	**0.016**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 65 individuals from Ban Chiang; and 79 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Caries

There is a fairly global adherence to the transition in dental infectious disease associated with subsistence (Cohen and Armelagos 1984, Larsen 1987, Lukacs 1989). A low prevalence of caries is found in hunting-gathering and mixed economies, typically less than 10%, and increasing in agricultural economies above 10% (Larsen 1987:377). There are exceptions, of course: Powell (1988) found a declining rate of caries in an agricultural economy in the Americas, a benefit of increased attrition because of stone grinding of maize which significantly altered the grittiness of the diet.

Caries frequency is nearly twice as high in the Ban Chiang permanent dental sample (7.1%, 76/1093) as that at Non Nok Tha (2.8%, 34/1233), although both of these frequencies are still below those predicted by agricultural subsistence. The depth and range of the significant differences in caries prevalence (Table 6.21) between the Ban Chiang and Non Nok Tha dental series are suggestive of substantial genetic, environmental, subsistence, and/or cultural differences in the two archaeological populations. There are no statistically significant sex differences in the frequency of caries in either sample.

In the Khok Phanom Di skeletal series, caries were observed in 10.8% of the teeth (139/1282), a number which suggests a more progressive economy (Tayles 1992). Caries are statistically greater in females (12.9%) than males (4.3%) in this series. Pit and fissure caries were more common in males in this sample, in contrast to interproximal and huge caries in females. No differences in caries types were noted in the Non Nok Tha series, but at Ban Chiang, occlusal surface caries were more common in females.

Table 6.21. Prevalence of Caries in Permanent Teeth (Individuals >15 years of age) By Site

Jaw/Tooth	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	**23/186**	**12.4**	**11/235**	**4.7**	**χ^2=8.259**	**0.004**
Premolars	1/151	0.7	1/189	0.5	FET	1.000
Canines	3/66	4.5	0/71	0.0	FET	0.109
Incisors	3/111	2.7	2/104	1.9	FET	1.000
Total Maxillary Caries	**30/514**	**5.8**	**14/599**	**2.3**	**χ^2=8.921**	**0.003**
Mandible Molars	**35/205**	**17.1**	**14/268**	**5.2**	**χ^2=17.562**	**0.000**
Premolars	3/164	1.8	5/173	2.9	FET	0.724
Canines	**6/79**	**7.6**	**1/88**	**1.1**	**FET**	**0.053**
Incisors	2/107	1.9	0/106	0.0	FET	0.498
Total Mandibular Caries	**46/555**	**8.3**	**20/635**	**3.1**	**χ^2=14.928**	**0.000**
All Molars	**58/391**	**14.8**	**25/503**	**5.0**	**χ^2=25.413**	**0.000**
All Premolars	4/315	1.3	6/362	1.7	FET	0.758
All Canines	**9/145**	**6.2**	**1/159**	**0.6**	**FET**	**0.007**
All Incisors	5/218	2.3	2/210	1.0	FET	0.450
Total Caries	**76/1069**	**7.1**	**34/1234**	**2.8**	**χ^2=23.876**	**0.000**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 64 individuals: 31 males, 33 females from Ban Chiang; and 80 individuals (38 males, 42 females) from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Table 6.22. Prevalence of Caries in Permanent Teeth (Individuals >15 years of age) By Site

Tooth Class		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Early Group	Molars	**27/193**	**14.0**	**8/285**	**2.8**	**χ^2=22.616**	**0.000**
	Premolars	3/163	1.8	2/197	1.0	FET	0.658
	Canines	1/76	1.3	1/89	1.1	FET	1.000
	Incisors	2/102	2.0	0/95	0.0	FET	0.497
All Early Group Caries		**33/534**	**6.2**	**11/666**	**1.7**	**χ^2=18.748**	**0.000**
Late Group	Molars	**31/208**	**14.9**	**16/205**	**7.8**	**χ^2=5.159**	**0.023**
	Premolars	1/160	0.6	4/155	2.6	FET	0.209
	Canines	**8/72**	**11.1**	**0/67**	**0.0**	**FET**	**0.006**
	Incisors	3/120	2.5	2/112	1.8	FET	1.000
All Late Group Caries		**43/560**	**7.7**	**22/539**	**4.1**	**χ^2=6.386**	**0.012**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 65 individuals: 31 males, 33 females, 1 ?sex from Ban Chiang; and 81 individuals (38 males, 42 females, 1?sex) from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Both Ban Chiang and Non Nok dental samples demonstrate an increase in caries frequencies over time (Table 6.22). Here the frequency of pathology noted in the Non Nok Tha teeth in both groups is less than that noted at Ban Chiang. The progressive increase in caries rate is consistent with increasing reliance on agricultural foodstuffs.

Dental Abscessing

The frequency of dental abscessing in the Ban Chiang skeletal series (6.1%) is more than three times that found in the Non Nok Tha series (1.9%), a difference which is reflected in the majority of the tooth sockets (Table 6.23). Although abscessing is expected to be more common in older aged individuals, the Non Nok Tha sample has more older individuals than the Ban Chiang sample. The greatest magnitude of difference is in abscessing of the canines, which at Ban Chiang (5.3%) is ten times as frequent as at Non Nok Tha (0.5%). Following that are the maxillary teeth and all incisors, both of which are more than four times greater in the Ban Chiang series. At both sites, abscessing is more common in male tooth sockets than female sockets, abscessing is rare before the age of 35 years, and females appear to get abscesses at an earlier age than males. Abscessing in these series appears to be related to attrition rather than caries, with a correlation to wear exposing the pulp chamber.

Table 6.23. Prevalence of Abscesses By Site in Adult Permanent Tooth Sockets

Jaw/Tooth Socket	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	7/167	4.2	5/236	2.1	FET	0.248
Premolars	**9/142**	**6.3**	**2/200**	**1.0**	**FET**	**0.009**
Canines	2/70	2.9	0/92	0.0	FET	0.185
Incisors	**7/127**	**5.5**	**0/145**	**0.0**	**FET**	**0.004**
Total Maxillary Abscesses	**25/506**	**4.9**	**7/673**	**1.0**	**χ^2=16.643**	**0.000**
Mandible Molars	**30/216**	**13.9**	**11/276**	**4.0**	**χ^2=15.557**	**0.000**
Premolars	5/169	3.0	6/199	3.0	χ^2=0.001	0.975
Canines	**6/81**	**7.4**	**1/99**	**1.0**	**FET**	**0.047**
Incisors	1/125	0.8	2/151	1.3	FET	1.000
Total Mandibular Abscesses	**42/591**	**7.1**	**20/725**	**2.8**	**χ^2=13.711**	**0.000**
All Molars	**37/383**	**9.7**	**16/512**	**3.1**	**χ^2=16.799**	**0.000**
All Premolars	14/311	4.5	8/399	2.0	χ^2=3.628	0.057
All Canines	**8/151**	**5.3**	**1/191**	**0.5**	**FET**	**0.012**
All Incisors	**8/252**	**3.2**	**2/296**	**0.7**	**FET**	**0.050**
Total Abscesses	**67/1097**	**6.1**	**27/1398**	**1.9**	**χ^2=29.569**	**0.000**

Note: A=affected, O=observed, M=molar, P=premolar, C=canine, I=incisor; FET=Fisher's Exact Test (2-tailed probabilities). Includes 62 individuals from Ban Chiang; and 75 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

The prevalence of abscessing is 6.0% (122/2047) in the Khok Phanom Di skeletal series, with a statistically significant difference in male (4.7%, 44/944) and female (7.1%, 78/1103) frequencies. This pattern compares quite well to that found at Ban Chiang. Tayles (1992) notes a change in the cause of abscessing over time at Khok Phanom Di, shifting from caries to wear in females, and from wear to caries in males. The frequency of abscessing in the South Asia, Harappa sample (3.06%) is more consistent with Non Nok Tha, but here there is a greater frequency in females than males (Lukacs 1992a).

Table 6.24. Abscessing Prevalence By Group and Site in Permanent Tooth Sockets

Jaw/Tooth Socket		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Early Group	Maxilla	**10/261**	**3.7**	**3/376**	**0.8**	**χ^2=6.691**	**0.010**
	Mandible	**21/278**	**7.6**	**8/391**	**2.0**	**χ^2=11.886**	**0.001**
	Total	**31/549**	**5.6**	**11/767**	**1.4**	**χ^2=18.377**	**0.000**
Late Group	Maxilla	**15/235**	**6.4**	**4/282**	**1.4**	**χ^2=8.924**	**0.003**
	Mandible	21/313	6.7	12/317	3.8	χ^2=2.712	0.1000
	Total	**36/548**	**6.6**	**16/599**	**2.7**	**χ^2=10.048**	**0.002**

Note: A=affected, O=observed, FET=Fisher's Exact Test (2-tailed probabilities). Includes 75 individuals from Ban Chiang; and 75 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Abscessing is more common in Ban Chiang tooth sockets than Non Nok Tha tooth sockets, when examined over time (Table 6.24). Although there is an increase in the frequency of abscessing within each sample over time, the changes are not statistically significant. This major difference between the two sites is likely to be related to the higher frequency of advanced attrition found in the Ban Chiang skeletal series, independent of age-at-death, which suggests some cultural or functional use of the dentition which is not occurring at Non Nok Tha.

Periodontal Disease

Alveolar Resorption

Resorption of the alveolar crest bone is quite comparable between the two sites (Table 6.25). Moderate and marked degrees are combined as "advanced" resorption. In the Ban Chiang sample, there were no instances of marked resorption, while in the Non Nok Tha remains, there were few cases. In the maxilla, resorption is more severe in the Ban Chiang sample, while in the mandible the prevalence is nearly the same. Advanced resorption is statistically more common in the summed observations at Ban Chiang (12.7%) than at Non Nok Tha (9.1%), in spite of the fact that the Non Nok Tha sample has more aged individuals. Advanced alveolar resorption is significantly greater in males than females at both sites.

Table 6.25. Prevalence of Alveolar Resorption in Adult Permanent Tooth Sockets, By Site

Jaw/Degree of Resorption Tooth Sockets		Ban Chiang		Non Nok Tha		Statistic*	
		A/O	%	A/O	%	Test	Probability
Maxilla	absent	237/430	55.1	259/468	55.3	**χ^2=4.805**	**0.028**
	slight	124/430	28.8	157/468	33.5		
	advanced	69/430	16.0	52/468	11.1		
Mandible	absent	304/482	63.1	369/554	66.6	χ^2=2.004	0.157
	slight	131/482	27.2	144/554	26.0		
	advanced	47/482	9.8	41/554	7.4		
Total	absent	541/912	59.3	628/1022	61.4	**χ^2=6.906**	**0.009**
	slight	255/912	28.0	301/1022	29.5		
	advanced	116/912	12.7	93/1022	9.1		

Note: A=affected, O=observed. Includes 57 individuals from Ban Chiang; and 74 individuals from Non Nok Tha. * Statistical testing of none/slight vs advanced, bold cells indicate statistical significance (α=0.10).

Alveolar resorption is reported by individual rather than tooth sockets in the Khok Phanom Di (Tayles 1992) and Harappan samples (Hemphill et al. 1991), a difference which prohibits comparisons here, but which can be resolved in future data analysis. Data is available for a small iron age site in Pakistan, where 5.2% (42/815) of the tooth sockets had resorption (Lukacs 1989).

Examining the occurrence of alveolar resorption, by group and site (Table 6.26), shows the lowest prevalence of resorption in the Non Nok Tha Early Group sample. The frequency of advanced resorption here (7.2%) is significantly less than that seen in the Early Group at Ban Chiang (13.2%). There is no significant change in Ban Chiang alveolar resorption over time. As noted in other analyses above, the prevalence of alveolar resorption in the Late Group at Non Nok Tha resembles that in the Early Group at Ban Chiang. In the Non Nok Tha sample there is a significant increase in advanced resorption in female tooth sockets in the Late Group. The increase in alveolar resorption in the Non Nok Tha sample is consistent with an increase in carbohydrates/processed foodstuffs.

Table 6.26. Alveolar Resorption By Group and Site in Adult Permanent Tooth Sockets

Group/Degree of Resorption		Ban Chiang		Non Nok Tha		Statistic*	
		A/O	%	A/O	%	Test	Probability
Early Group	absent	277/486	57.0	362/540	67.0	**χ^2=10.603**	**0.001**
	slight	145/486	29.8	139/540	25.7		
	advanced	64/486	13.2	39/540	7.2		
Late Group	absent	264/426	62.0	246/454	54.2	χ^2=0.059	0.808
	slight	110/426	25.8	155/454	34.1		
	advanced	52/426	12.2	53/454	11.7		

Note: A=affected, O=observed. Includes 57 individuals from Ban Chiang; and 71 individuals from Non Nok Tha. * Statistical testing of none/slight vs advanced, **bold cells** indicate statistical significance (α=0.10).

Calculus

Calculus was scored on a four point scale (none, slight, moderate, marked), the latter two categories collapsed into a single "advanced" designation. Calculus is more common and more severe in the maxillary teeth at Ban Chiang than at Non Nok Tha; while in the mandible, although there is more calculus at Ban Chiang, advanced calculus is greater in the Non Nok Tha series (Table 6.27). Since the number of teeth observed in this case is nearly identical between the two sites, these frequencies are valid in direct comparison. In the summary total, Non Nok Tha teeth have more advanced calculus than the teeth from Ban Chiang. This difference may be related to the older age-at-death of the Non Nok Tha dental sample, or to differences in calculus loss through cleaning and handling of the teeth during repeated analysis, or cultural activities involving cleaning the teeth, betel-nut chewing, etc.

Table 6.27. Prevalence of Calculus in Adult Permanent Tooth Sockets, By Site

Jaw/Tooth Socket		Ban Chiang		Non Nok Tha		Statistic*	
		A/O	%	A/O	%	Test	Probability
Maxilla	absent	31/453	6.8	89/450	19.8	**χ^2=33.144**	**0.000**
	slight	292/453	64.5	257/450	57.1		
	advanced	130/453	28.7	104/450	23.1		
Mandible	absent	31/496	6.3	63/495	12.7	**χ^2=37.989**	**0.000**
	slight	342/496	69.0	248/495	50.1		
	advanced	123/496	24.8	184/495	37.2		
Total	absent	62/949	6.5	152/945	16.1	**χ^2=54.717**	**0.000**
	slight	634/949	66.8	505/945	53.4		
	advanced	253/949	26.7	288/945	30.5		

Note: A=affected, O=observed. Includes 57 individuals from Ban Chiang; and 74 individuals from Non Nok Tha. * Statistical testing of none/slight vs advanced, **bold** cells indicate statistical significance (α=0.10).

Again, the Khok Phanom Di and Harappa distribution of calculus is reported by individual rather than tooth, and so no comparisons are possible. Calculus is noted in 19.4% of the teeth from a iron age site in Pakistan (Lukacs 1989), although it is not clear if this is the frequency of all calculus or marked calculus. At any rate, it is a low frequency compared to the northeastern Thai series, and may reflect better oral hygiene, different food preparation techniques or different dietary staples.

Table 6.28. Calculus By Group and Site in Adult Permanent Tooth Sockets

Jaw/Tooth Socket		Ban Chiang		Non Nok Tha		Statistic*	
		A/O	%	A/O	%	Test	Probability
Early Group	absent	13/479	2.7	118/497	23.7	χ^2=0.200	0.655
	slight	319/479	66.6	233/497	46.9		
	advanced	147/479	30.7	146/497	29.4		
Late Group	absent	49/470	10.4	33/426	7.7	**χ^2=10.921**	**0.001**
	slight	315/470	67.0	255/426	59.9		
	advanced	106/470	22.6	138/426	32.4		

Note: A=affected, O=observed. Includes 63 individuals from Ban Chiang; and 63 individuals from Non Nok Tha. *Statistical testing of none/slight vs advanced, **bold** cells indicate statistical significance (α=0.10).

Comparing the distribution of calculus by group and site (Table 6.28), demonstrates a fairly consistent frequency of advanced calculus in both the Early and Late Groups. In general, there is a decrease in calculus at Ban Chiang over time, while at Non Nok Tha there is an increase in calculus. There is a significant increase in advanced calculus in females in both the Non Nok Tha and Ban Chiang sample over time, suggesting that females may have had greater access to a foodstuff which may assist in plaque production.

Dental Attrition

Comparing advanced dental attrition (wear exposing the pulp and down to the roots) between the Ban Chiang and Non Nok Tha sample (Table 6.29), shows more advanced wear in Ban Chiang teeth. There are significant differences in every tooth class except the mandibular canines and incisors. These dramatic results, in the face of an older age-at-death sample from Non Nok Tha, suggest that the Ban Chiang diet was coarser, or that teeth were used for processing, or other functional or cultural activity. At both sites, the greatest wear can be attributed to male teeth.

Table 6.29. Prevalence of Advanced Dental Attrition in Adult Permanent Teeth, By Site

Jaw/Tooth Class	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Maxilla Molars	14/187	7.5	6/230	2.6	**χ^2=5.375**	**0.020**
Premolars	24/157	15.3	14/185	7.6	**χ^2=5.124**	**0.024**
Canines	17/70	24.3	6/71	8.5	**χ^2=6.474**	**0.011**
Incisors	29/113	25.7	5/101	5.0	**χ^2=17.122**	**0.000**
Total Maxillary Attrition	84/527	15.9	31/587	5.3	**χ^2=34.075**	**0.000**
Mandible Molars	28/210	13.3	11/253	4.3	**χ^2=12.011**	**0.001**
Premolars	28/169	16.6	14/167	8.4	**χ^2=5.145**	**0.023**
Canines	15/82	18.3	8/85	9.4	**χ^2=2.772**	**0.096**
Incisors	14/107	13.1	12/107	11.2	χ^2=0.175	0.676
Total Mandibular Attrition	85/568	15.0	45/612	7.4	**χ^2=17.411**	**0.000**
All Molars	42/397	10.6	17/483	3.5	**χ^2=17.362**	**0.000**
All Premolars	52/326	16.0	28/352	8.0	**χ^2=10.399**	**0.001**
All Canines	32/152	21.1	14/156	9.0	**χ^2=8.840**	**0.003**
All Incisors	43/220	19.5	17/208	8.2	**χ^2=11.472**	**0.001**
Total Advanced Attrition	169/1095	15.4	76/1199	6.3	**χ^2=49.63**	**0.000**

Note: A=affected, O=observed. Includes 65 individuals from Ban Chiang; and 80 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

In the coastal Khok Phanom Di series, advanced dental wear is reported in 8.8% (112/1272) of the adult teeth, falling in the mid-range of tooth wear in the northeastern Thai samples. Female teeth (12.3%, 77/628) had more advanced wear than male teeth (5.4%, 35/644) in this series, and there was a decline in advanced wear over time.

In contrast, advanced attrition in the Ban Chiang and Non Nok Tha samples increases over time (Table 6.30), although the difference is not significant in the Ban Chiang sample. A significantly higher frequency of advanced attrition is present in both Ban Chiang groups than in the Non Nok Tha sample, an interesting finding in as much as the Non Nok Tha sample has an older mean age-at-death. The difference is again suggestive of use of the teeth as tools.

There is also an interesting sex component in the prevalence of advanced attrition over time. At each of the sites, there is a statistically significant <u>increase</u> in advanced attrition in male teeth over time, and a statistically significant <u>decrease</u> in attrition in female teeth. This pattern is enigmatic in that if the population is shifting to more processed food then male teeth should also reflect declining wear. The increase in male wear then may be reflecting a cultural or functional activity which is gender specific (e.g. chewing betel nut), or the continued reliance on high protein/fibrous foods eaten while traveling.

Table 6.30. Frequency of Advanced Attrition in Adult Permanent Tooth Sockets, By Site

Jaw/Degree of Resorption Tooth Sockets		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Early Group	absent/slight	454/527	86.1	607/642	94.5	**χ^2=24.356**	**0.000**
	advanced	73/527	13.9	35/642	5.5		
Late Group	absent/slight	472/568	83.1	495/536	92.4	**χ^2=21.718**	**0.000**
	advanced	96/568	16.9	41/536	7.6		

Note: A=affected, O=observed. Includes 57 individuals from Ban Chiang; and 74 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Summary of Permanent Dental Indicators

The adult dental pathologies recorded in the Non Nok Tha and Ban Chiang skeletal samples place them in a transitional period of subsistence systems, and by inference in a "healthy" situation. Capitalizing on the observation that the Late Group at Non Nok Tha often resembles the Early Group at Ban Chiang, the prevalence of dental pathologies is plotted to visualize the temporal trends (Figure 6.13). Abscessing, caries and alveolar resorption demonstrate very clear trends toward increasing frequencies which are consistent with the predictive model.

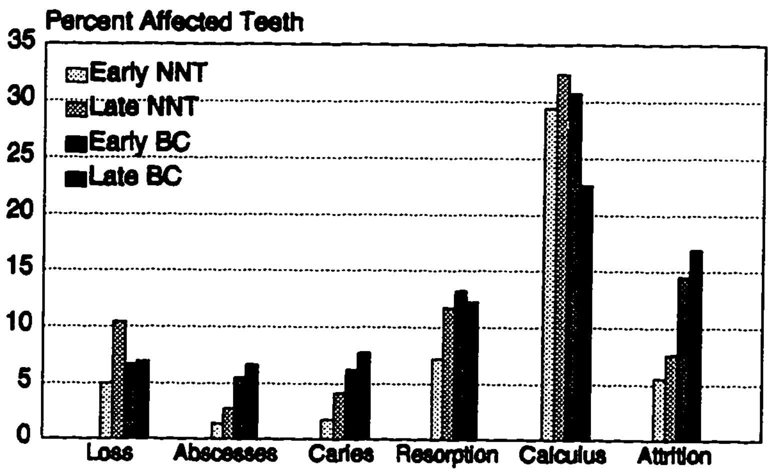


Figure 6.13. Temporal Trends in Adult Dental Pathologies

Advanced dental attrition in these northeastern Thai skeletal samples is increasing over time, the opposite of the predicted trend, and perhaps the effect of a cultural or functional use of the dentition, such as increased betel-nut chewing. Detailed examination of the advanced wear patterns might further illuminate this aberrancy. The decreasing prevalence of advanced calculus in the Late Group at Ban Chiang may reflect the lack of old individuals in the sample. Still, no change in the presence of calculus is an anomaly, as this pathology typically increases with agricultural subsistence. The continued high prevalence of calculus may be related to a cultural practice such as betel nut chewing which maintains an alkaline oral environment.

Premortem tooth loss is a highly variable pathology and is unpredictable relative to subsistence level (Lukacs 1989). In these samples, there appears to be a general trend toward increasing tooth loss, which is consistent with the observed increases in attrition and abscessing. As well, the majority of premortem tooth loss occurs in the older age intervals at both sites and in both groups.

Evaluation of the dental pathologies in the Non Nok Tha and Ban Chiang skeletal series reflective of subsistence stress suggest these communities practiced a mixed economy, with continued reliance on a broad-based subsistence system. The trends exhibited support a movement toward increased starchy foodstuffs, but with a maintenance of cultural or functional use of the teeth contributing to increasing attrition.

OSTEOARTHRITIS

Osteoarthritis is a complicated, multi-factorial condition which suggests that attempting to link the pattern and prevalence of osteoarthritis in an individual skeleton with a specific occupation is futile (Waldron 1994). However, broad interpretations of population patterns of osteoarthritis prevalence by side, sex and joints affected might afford valid conclusions (Waldron 1994, e.g. Cook 1984). Examination of temporal change demonstrates a general decline in osteoarthritis with the transition toward sedentism, although some populations show a decrease followed by an increase with intensive agriculture (Cohen and Armelagos 1984). This general decline in osteoarthritis is also reflected in native populations at Western Contact (c.f. Larsen and Milner 1994, Verano and Ubelaker 1992) perhaps related to early death in the latter populations, but changes in the patterns of joints affected are also noted (Larsen and Ruff 1994).

Osteoarthritis is perhaps the most difficult pathology to interpret and compare because of the extremely subjective nature of the observations, and the variety of reporting methods. By Waldron's (1992) working definition of appendicular osteoarthritis, only the combination lesions (lipping and porosis) should be considered as evidence of osteoarthritis, resulting in the very rare occurrence of osteoarthritis of the appendicular skeleton in these series. In this analysis, osteoarthritis is defined as the presence of circumferential lipping, porosis of the articular surface, or a combination of the two, in any degree. Because the majority of the skeletal material is incomplete and much of it fragmentary, the data are reported by articular surfaces scored rather than by individual. The results will be compared to those reported by Tayles (1992) for Khok Phanom Di.

Appendicular Osteoarthritis

The distribution of osteoarthritis in the appendicular skeletons of adults from Ban Chiang and Non Nok Tha has several common characteristics. Osteoarthritis is more common in males than females, more common in the lower limbs than the upper limbs, and generally more common in the articular surfaces of the right side than the left. At both sites, slight articular lipping and/or porosis is noted in early adulthood in both males and females. However, the prevalence of osteoarthritis in the appendicular articular facets is significantly greater in Ban Chiang adults than in the Non Nok Tha adults (Table 6.31).

Table 6.31. Appendicular Osteoarthritis in Northeastern Thai Adults

Functional Unit Osteoarthritis Present		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	χ^2 Value	*p*
Upper Limb	Shoulder	119/248	48.0	66/299	22.1	**40.661**	**0.000**
	Elbow	185/325	56.9	161/435	37.0	**29.739**	**0.000**
	Wrist	100/190	52.6	73/221	33.0	**16.102**	**0.000**
	Hand	529/1198	44.2	266/1336	19.9	**172.469**	**0.000**
Lower Limb	Pelvis	144/221	65.2	122/295	41.4	**28.661**	**0.000**
	Knee	162/427	37.9	132/488	27.0	**12.385**	**0.000**
	Ankle	117/185	63.2	136/258	52.7	**4.877**	**0.027**
	Foot	798/1359	58.7	562/1708	32.9	**204.369**	**0.000**

Note: Osteoarthritis of all kinds and degrees. A=affected, O=observed. **Bold** indicates statistical significance (α=0.10). Includes 79 adults from Ban Chiang (39 males, 40 females), and 110 adults from Non Nok Tha (53 males, 57 females).

Since the Non Nok Tha sample has an older mean age-at-death than the Ban Chiang sample, this finding is suggestive of either differing genetic susceptibility, or a more strenuous or repetitive physical environment at Ban Chiang.

Contrasting the prevalence and distribution of osteoarthritis of the appendicular skeleton in the Ban Chiang and Non Nok Tha skeletal series with that from the coastal population of Khok Phanom Di, may further illuminate these differences (Tayles 1992). Osteoarthritis was scored by joint and collapsed into functional units similar to the method employed in this dissertation, although the hip is separate from the sacro-iliac joint of the pelvis in the former analysis. The results are presented by articular surface as well as individual, except in the hands and feet which are reported only by individual. Figure 6.14 compares the distribution of all kinds and degrees of osteoarthritis of the articular surfaces of the appendicular skeleton. Perhaps the most outstanding difference is the greater prevalence of osteoarthritis of the shoulder and knee in the Khok Phanom Di skeletal series; while in the northeastern Thai samples, osteoarthritis is more common in the elbow, wrist, ankle and feet. While differential susceptibility to osteoarthritis is a factor, these differences may also reflect greater use of the shoulders, in activities such as casting a net or poling a boat for example, in the Khok Phanom Di series.

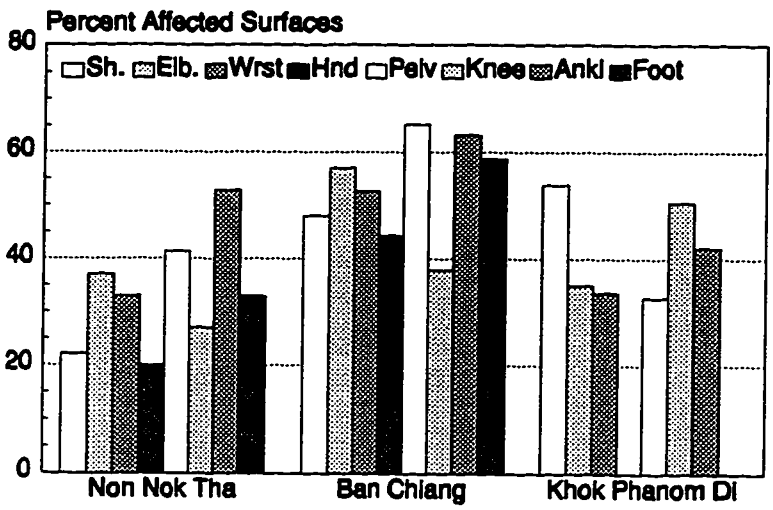


Figure 6.14. Appendicular Osteoarthritis

The increase in osteoarthritis of the appendicular skeleton over time at Ban Chiang is buffered by the absence of change when age was controlled. At Non Nok Tha, an increase in osteoarthritis in the Late Group was supported by controlled age groups, except for a decline in the old-aged males.

Contrasting the groups at Ban Chiang and Non Nok Tha (Table 6.32), the greater prevalence of appendicular osteoarthritis at Ban Chiang is maintained within the group sub-samples, and is statistically significant in every functional group. Thus, although there is a relative increase in osteoarthritis in the Late Group at Non Nok Tha, the prevalence of

Table 6.32. Appendicular Osteoarthritis, By Group, in Northeastern Thai Adults

Functional Unit Osteoarthritis Present Affected/Observed	Early Group						Late Group					
	Ban Chiang		Non Nok Tha		Statistic		Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	χ^2	*p*	A/O	%	A/O	%	χ^2	*p*
Upper Limb Shoulder	48/105	45.7	26/151	17.2	**24.472**	**0.000**	67/136	49.3	40/147	27.2	**14.612**	**0.000**
Elbow	82/136	60.3	72/234	30.8	**30.857**	**0.000**	103/189	54.5	89/197	45.2	**3.351**	**0.067**
Wrist	48/92	52.2	30/104	28.8	**11.088**	**0.001**	52/98	53.1	43/115	37.4	**5.258**	**0.022**
Hand	234/494	47.4	107/630	17.0	**120.953**	**0.000**	293/702	41.7	159/706	22.5	**59.635**	**0.000**
Lower Limb Pelvis	74/101	73.3	53/144	36.8	**31.611**	**0.000**	70/120	58.3	69/151	45.7	**4.275**	**0.039**
Knee	68/185	36.8	61/249	24.5	**7.636**	**0.006**	94/242	38.8	71/239	29.7	**4.453**	**0.035**
Ankle	54/82	65.9	49/105	46.7	**6.851**	**0.009**	63/103	61.2	86/151	57.0	0.448	0.503
Foot	366/612	59.8	190/669	28.4	**128.311**	**0.000**	432/747	57.8	371/1037	35.8	**85.335**	**0.000**

Note: Osteoarthritis of all kinds and degrees. A=affected, O=observed. **Bold** indicates statistical significance (α=0.10). Includes 78 adults from Ban Chiang (39 males, 39 females) and 109 adults from Non Nok Tha (52 males, 57 females).

osteoarthritis is still significantly less than that at Ban Chiang. Again, this finding is enigmatic given the larger number of older aged individuals in the Non Nok Tha skeletal series, and is suggestive of genetic susceptibility or differences in the physical demands on the inhabitants at Ban Chiang.

Visual examination of the prevalence of osteoarthritis of the appendicular skeleton over time in the Ban Chiang and Non Nok Tha skeletal series (Figure 6.15) illustrates the differences more easily. Evident from this distribution is that the prevalence of osteoarthritis in Non Nok Tha functional units relative to each other remains the same through time, although all show an increase. In other words, in the Early Group, the elbow and wrist in the upper limb, and the pelvis and ankle in the lower limb surpass the other joints; the same is true in the Late Group. When contrasted to the Ban Chiang sample, the elbow, pelvis, and ankle remain the most commonly affected, but there is a general "catching up" of the other articular surfaces - resulting in a flattening of the bars of the upper limb. Finally, in the Late

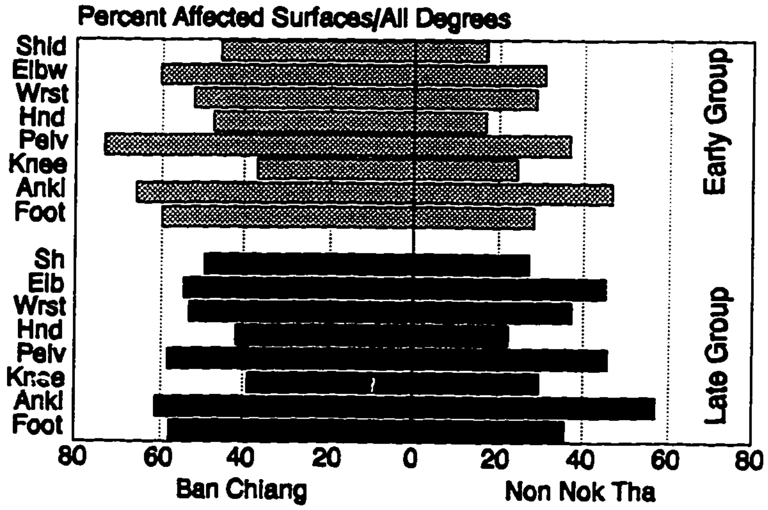


Figure 6.15. Temporal Distribution of Osteoarthritis

Group at Ban Chiang, the shoulder, elbow and wrist exhibit nearly equal amounts of osteoarthritis, as do the ankle, foot and pelvis. Osteoarthritis of the upper limb is nearly as prevalent as that of the lower limb, suggesting an increased use of the upper limb in strenuous activities, perhaps associated with managing water buffalo behind a plow, mining clay, pottery or metal manufacturing, etc.

Axial Osteoarthritis

Observations of degenerative change in the spinal column are typically so voluminous that data management requires combining and collapsing categories until very little of the original variability remains. As well, when a skeletal collection is very well preserved, reporting by individual seems appropriate, but when the collection is disarticulated, fragmentary, and poorly preserved, it makes much less sense. Since the goal is to ascertain patterns of osteoarthritis, then using all articular surfaces observed takes on added usefulness (c.f. Waldron 1994). This section will highlight the prevalence of osteoarthritis in the Non Nok Tha and Ban Chiang skeletal series, for the details the reader is referred back to the site chapters. As with the appendicular skeleton, results are grouped according to functional units, and reported by articular surface observed. All observations of osteoarthritis of any kind (lipping, porosis or a combination of the two) and degree (none to marked) are included.

Osteoarthritis of the articular surfaces of the temporo-mandibular joint (TMJ) is statistically greater in Ban Chiang adults than Non Nok Tha adults, when examined by sex, group and overall (Table 6.33). There are no statistically significant sex differences in either site, nor are the temporal changes statistically significant.

Table 6.33. Prevalence of Temporo-Mandibular Joint Osteoarthritis in Adults, By Site

Sex/Group Osteoarthritis Present	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Male	15/56	26.8	3/97	3.1	**χ^2=19.199**	**0.000**
Female	8/47	17.0	3/67	4.5	**FET**	**0.029**
Early Group	13/46	28.3	2/91	2.2	**χ^2=21.287**	**0.000**
Late Group	8/53	15.1	4/73	5.5	**χ^2=3.294**	**0.070**
Total TMJ	23/103	22.3	6/164	3.7	**χ^2=22.781**	**0.000**

Note: A=affected, O=observed, TMJ=temporomandibular joint (includes bilateral articular surfaces of the mandibular condyle and occipital fossa), FET=Fisher's Exact Test (one-tailed probability). All types and degrees of osteoarthritis. Includes 38 individuals from Ban Chiang; and 63 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Counting any individual with at least one of the four articular surfaces of the TMJ, osteoarthritis is noted in 34.2% of Ban Chiang adult individuals (13/38); four females (23.5%, 4/13) and nine males (42.9%, 9/21). In the Non Nok Tha sample, osteoarthritis is noted in only 6.3% of individuals (4/63), occurring equally in males (6.1%, 2/33) and females (6.7%, 2/30). The greater prevalence of osteoarthritis in the Ban Chiang series, especially in males, is consistent with the greater degree of dental attrition noted in the sample, and maybe reflecting the use of the jaws/teeth as a tool, betel-nut chewing, or other activity.

In contrast, in the Khok Phanom Di sample, osteoarthritis of the TMJ was noted in 46.3% of adult individuals (25/54), more commonly in females (16/31, 51.6%) than males (9/23, 39.1%). While the prevalence of osteoarthritis in Khok Phanom Di males is consistent with Ban Chiang males, the greater prevalence overall and in females is again, suggestive of accessory use of the teeth/jaws for purposes other than mastication.

Occipital-Cervical Complex Osteoarthritis

Ban Chiang adults also have more osteoarthritis of the articular surfaces of the C1-2 and dens facets than Non Nok Tha adults (Table 6.34). In both sites, osteoarthritis in this complex is more common in males than females, with initial changes at age 35-40 years and advanced changes in the 45-50 year age interval. There is little temporal change in the Non Nok Tha sample, other than a statistically significant decline in osteoarthritis of the dens. In the Ban Chiang series, osteoarthritis of the dens increases in the Late Group, attributable to an increase in males. No data from the Khok Phanom Di skeletal series is available for comparison.

Table 6.34. Prevalence of Occiput-Cervical Complex Osteoarthritis in Adults, By Site

Group/Articulation Osteoarthritis Present		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Early	Occiput-C1	31/38	81.6	50/71	70.4	χ^2=1.614	0.204
	C1-C2	37/39	94.9	35/69	50.7	**χ^2=21.853**	**0.000**
	Dens	12/21	57.1	11/27	40.7	χ^2=1.273	0.259
Late	Occiput-C1	33/45	73.3	49/67	73.1	χ^2=0.001	0.981
	C1-C2	37/46	80.4	32/71	45.1	**χ^2=14.429**	**0.000**
	Dens	18/26	69.2	3/29	10.3	**χ^2=20.140**	**0.000**
Total	Occiput-C1	65/84	77.4	99/138	71.7	χ^2=0.861	0.353
	C1-C2	77/88	87.5	67/140	47.9	**χ^2=36.495**	**0.000**
	Dens	30/47	63.8	14/56	25.0	**χ^2=15.745**	**0.000**

Note: All types and degrees of osteoarthritis. A=affected, O=observed, C=cervical. Includes 36 individuals from Ban Chiang; and 59 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Cervical Vertebral Osteoarthritis

The articular facets and vertebral end-plates of the remaining cervical vertebrae (C2-C7) at Ban Chiang are affected with osteoarthritic changes more often than those at Non Nok Tha (Table 6.35). Males have more osteoarthritis than females in both sites, and males have a greater prevalence of osteoarthritis in the lower cervical vertebrae, while females have a greater prevalence in the upper levels. Osteoarthritic changes of the articular facets are seen by age 30 years, while changes in the end-plates occur in the older age intervals at both sites. Osteoarthritis of both the articular facets and end-plates increases over time at Ban Chiang and Non Nok Tha.

Table 6.35. Prevalence of Cervical Vertebral Osteoarthritis in Adults, By Site

Sex/Group Osteoarthritis Present		Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Male	Facets	196/303	64.7	128/386	33.2	**χ^2=67.724**	**0.000**
	End-plates	41/144	28.5	38/221	17.2	**χ^2=6.539**	**0.011**
Female	Facets	134/251	53.4	40/249	16.1	**χ^2=79.738**	**0.000**
	End-plates	25/112	22.3	11/131	8.4	**χ^2=9.276**	**0.002**
Early	Facets	107/222	48.2	67/264	25.4	**χ^2=27.321**	**0.000**
	End-plates	18/105	17.1	15/162	9.3	**χ^2=3.655**	**0.056**
Late	Facets	201/310	64.8	101/371	27.2	**χ^2=96.819**	**0.000**
	End-plates	47/145	32.4	34/190	17.9	**χ^2=9.456**	**0.002**
Total	Facets	330/554	59.6	168/635	26.5	**χ^2=133.25**	**0.000**
	End-plates	66/256	25.8	49/352	13.9	**χ^2=13.595**	**0.000**

Note: All types and degrees of osteoarthritis. A=affected, O=observed. Includes 45 individuals from Ban Chiang; and 62 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Thoracic Vertebral Osteoarthritis

Following the patterns noted in the cervical spine, there is more osteoarthritis of the thoracic vertebrae in Ban Chiang adults than in Non Nok Tha adults (Table 6.36). There is more osteoarthritis in males than females at both sites, with Ban Chiang males exhibiting greater prevalence in the lower thoracic spine, while females have more osteoarthritis in the upper levels. In the Non Nok Tha sample, osteoarthritis is most common in the lower thoracic elements in both sexes.

There is a general increase in osteoarthritis over time at both sites, although the change is not statistically significant in the Non Nok Tha series. The presence of statistically significant differences in every analysis is remarkable, given that the Ban Chiang series is lacking older adults.

Table 6.36. Prevalence of Thoracic Vertebral Osteoarthritis in Adults, By Site

Sex/Group	Osteoarthritis Present	Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Male	Facets	514/671	76.6	352/703	50.1	**χ^2=103.70**	**0.000**
	End-plates	135/287	47.0	81/408	19.9	**χ^2=58.131**	**0.000**
Female	Facets	230/456	44.5	155/436	35.6	**χ^2=7.459**	**0.006**
	End-plates	26/189	13.8	47/274	17.2	χ^2=0.972	0.324
Early	Facets	270/475	56.8	242/546	44.3	**χ^2=15.926**	**0.000**
	End-plates	75/230	32.6	56/378	14.8	**χ^2=26.784**	**0.000**
Late	Facets	427/632	67.6	265/593	44.7	**χ^2=65.134**	**0.000**
	End-plates	86/241	35.7	72/304	23.7	**χ^2=9.404**	**0.002**
Total	Facets	717/1127	63.6	507/1139	44.5	**χ^2=83.266**	**0.000**
	End-plates	161/476	33.8	128/682	18.8	**χ^2=33.928**	**0.000**

Note: All types and degrees of osteoarthritis. A=affected, O=observed. Includes 50 individuals from Ban Chiang and 62 from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Table 6.37. Prevalence of Rib Facet Osteoarthritis in Adults, By Site

Sex/Group Osteoarthritis Present	Ban Chiang		Non Nok Tha		Statistic	
	A/O	%	A/O	%	Test	Probability
Male	474/711	66.7	317/729	43.5	**χ^2=78.137**	**0.000**
Female	201/500	40.2	107/385	27.8	**χ^2=14.758**	**0.000**
Early	330/592	55.7	223/543	41.1	**χ^2=24.414**	**0.000**
Late	322/593	54.3	201/571	35.2	**χ^2=42.884**	**0.000**
Total Rib Facets	675/1211	55.7	424/1114	38.1	**χ^2=72.750**	**0.000**

Note: All types and degrees of osteoarthritis. A=affected, O=observed. Includes 53 individuals from Ban Chiang; and 66 individuals from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

A similar pattern is evident in osteoarthritis of the rib facets at the two sites: There is a higher frequency of osteoarthritis in male rib facets than female facets, and there is more osteoarthritis in Ban Chiang rib facets than Non Nok Tha rib facets (Table 6.37). There is no temporal change in the frequency of osteoarthritis in the Ban Chiang rib facets, and the slight decrease in rib osteoarthritis in the Non Nok Tha series is attributable to a decline in frequency in the old aged adults in the Late Group.

Lumbar Vertebral Osteoarthritis

Finally, at the lower end of the vertebral column, the pattern remains the same (Table 6.38). There is more osteoarthritis of both facets and end-plates in males than females, and more osteoarthritis at Ban Chiang than Non Nok Tha. At both sites, slight osteoarthritic changes appear in young adults in the articular facets, and at middle age in the end-plates.

There is no statistically significant temporal change in osteoarthritis of the lumbar facets and end-plates in the Non Nok Tha skeletal sample. At Ban Chiang though, there is a decline in osteoarthritis of the posterior facets (in both sexes) and an increase in osteoarthritis of the vertebral end-plates (also in both sexes).

Table 6.38. Prevalence of Lumbar Vertebral Osteoarthritis in Adults, By Site

Sex/Group	Osteoarthritis Present	Ban Chiang		Non Nok Tha		Statistic	
		A/O	%	A/O	%	Test	Probability
Male	Facets	300/327	91.7	242/333	72.7	**χ^2=40.867**	**0.000**
	End-plates	65/103	63.1	49/146	33.6	**χ^2=21.238**	**0.000**
Female	Facets	214/287	74.6	189/287	65.9	**χ^2=5.206**	**0.023**
	End-plates	50/94	53.2	43/145	29.7	**χ^2=13.290**	**0.000**
Early	Facets	253/275	92.0	206/302	68.2	**χ^2=50.066**	**0.000**
	End-plates	61/112	54.5	53/165	32.1	**χ^2=13.752**	**0.000**
Late	Facets	261/339	77.0	225/318	70.8	**χ^2=3.315**	**0.069**
	End-plates	54/85	63.5	39/126	91.0	**χ^2=21.854**	**0.000**
Total	Facets	514/614	83.7	431/620	69.5	**χ^2=34.670**	**0.000**
	End-plates	115/197	58.4	92/291	31.6	**χ^2=34.442**	**0.000**

Note: All types and degrees of osteoarthritis. A=affected, O=observed. Includes 48 individuals from Ban Chiang and 61 from Non Nok Tha. **Bold** indicates statistical significance (α=0.10).

Summary of Axial Osteoarthritis

There are a number of consistencies between the prevalence of axial osteoarthritis in the Non Nok Tha and Ban Chiang skeletal remains. Osteoarthritis of all degrees and kinds occurs more commonly in male axial skeletons than female axial skeletons. Although the Non Nok Tha sample has more older adults, osteoarthritis of all aspects of the axial skeleton is greater in the Ban Chiang remains.

At both sites, slight osteoarthritis of the posterior articular facets is observed in early adulthood, with osteoarthritis of the vertebral end-plates appearing at age 35 years. Sex differences in the distribution of osteoarthritis in the vertebral column are also similar at both sites: the upper cervical vertebrae have more osteoarthritis in females, while in males, the lower elements are affected. A similar pattern is observed in the thoracic spine, though the lumbar spine osteoarthritis is distributed fairly evenly across the whole segment.

The biomechanics of upright posture, handedness, and the curvature of the spine, are the major contributors to the "typical" pattern of osteophytosis of the spine. The highest prevalence occurs in the lumbar vertebrae (peak at L3-4), followed by the thoracic vertebrae (peak T7-11) and finally the cervical segment (peak at C5-6) [Bridges 1994]. The region of the lowest prevalence of osteoarthritis may be T1, T12, and L5-S1. Atypical patterns have been described and attributed to the use of tump lines (increased cervical osteoarthritis), or a band across the chest (increased thoracic osteoarthritis), but are not adequate to explain all of the variation (Bridges 1994).

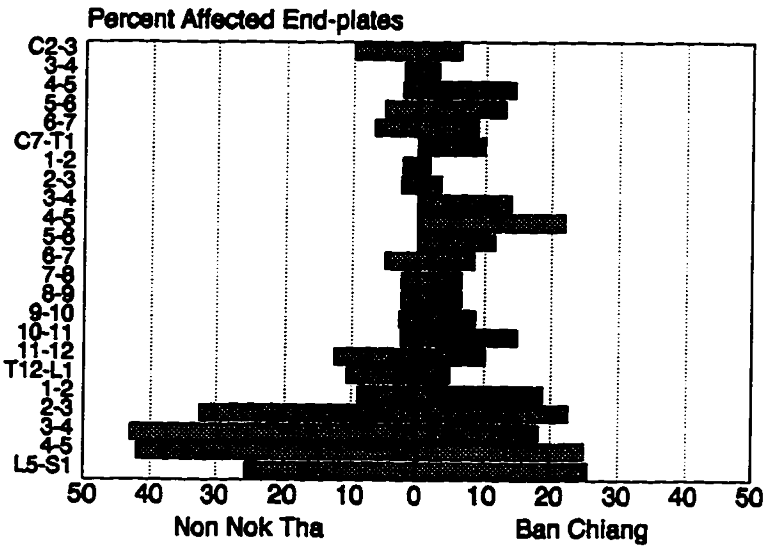


Figure 6.16. Vertebral Centrum Osteophytosis

Figure 6.16 contrasts the prevalence of osteophytosis of the vertebral end-plates at Non Nok Tha and Ban Chiang, demonstrating interesting pattern differences. In the Non Nok Tha sample, peak cervical osteophytosis occurs at C2-3, peak thoracic osteophytosis at T11-12, and peak lumbar osteophytosis at the expected L3-4, with osteophytosis virtually non-existent in the upper and middle thoracic levels. In contrast, the Ban Chiang sample exhibits a peak in cervical osteoarthritis at C4-6, a peak in thoracic osteoarthritis at T4-5, and a peak in the lumbar region at L4-S1. None of the segments of the Ban Chiang axial skeleton is exempt from osteoarthritis. This anomalous pattern might be suggestive of a cause other than weight-bearing, such as a genetic osteoarthritis (e.g. ankylosing spondylitis, or DISH), but no corroborating evidence is found.

Alternatively, the differences in the patterns of osteophytosis might relate to varying burden-carrying systems, or varying physical activities. Carrying burdens on the top of the head has been invoked to explain increased osteoarthritis of the cervical spine, especially the

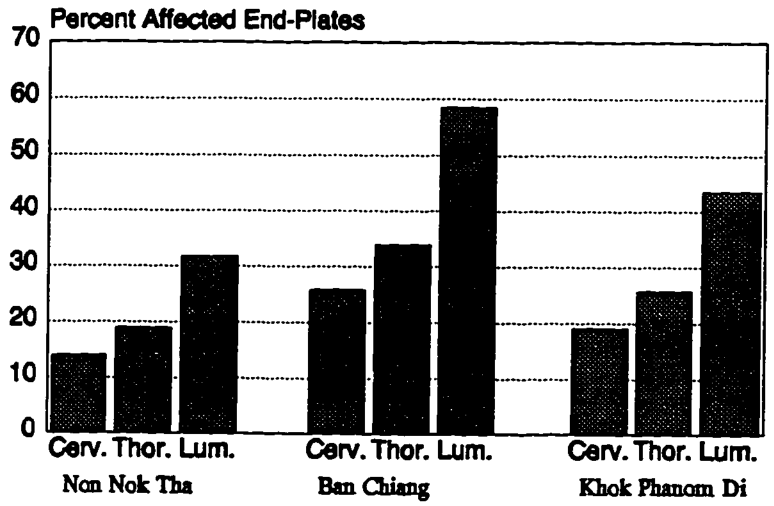


Figure 6.17. Osteoarthritis of the Vertebral Centra

facets, in the Harappan, South Asia, sample (Lovell 1994). The use of a bamboo pole slung across the shoulders, and falling at the upper thoracic spine, might result in increased osteophytosis such as that seen in the Ban Chiang remains.

Comparing the prevalence of osteoarthritis (includes both osteophytosis and osteoporosis) of the vertebral end-plates in the Ban Chiang, Non Nok Tha and Khok Phanom Di samples (Figure 6.17), demonstrates a consistent pattern of increasing osteoarthritis down the spine. Unfortunately, detailed data on osteoarthritis prevalence by level is not available for the Khok Phanom Di series, but prevalences there are generally intermediate to Non Nok Tha and Ban Chiang.

TRAUMA

Evidence for trauma in the skeletal samples from Ban Chiang and Non Nok Tha resides primarily in the presence of healed fractures, and associated traumatic osteoarthritis. The Ban Chiang skeletal sample has evidence of more traumatic injury than does the larger sample from Non Nok Tha (Table 6.39). At Ban Chiang, 22 individuals; 13 males (59.1%), seven females (31.8%), and two subadults (9.1%), are noted to have injuries, of which seven have more than one element affected (31.8%). In the 17 Non Nok Tha individuals with traumatic injury, six have more than one element affected (35.3%), and the sex distribution is nearly even: nine males (52.9%) and eight females (47.1%). There is no evidence of healed fractures in the subadults at Non Nok Tha.

Although injured elements are common to the two sites, the type of fracture or location of the fracture is different. Certain bones are more commonly fractured than others by reason of their size, location, function, and the mechanics of movement (Rockwood and

Table 6.39. Element Frequencies of Trauma in Northeastern Thailand Adults

Element*/Site		Ban Chiang		Non Nok Tha		Statistic
		A/O	%	A/O	%	
Skull	Frontal	2/49	4.1	0/77	0.0	FET 0.149
	Parietal	0/45	0.0	2/80	2.5	FET 0.535
Vertebrae	C1-7	3/55	5.5	2/69	2.9	FET 0.654
	L4-5 spondylolysis	6/71	8.5	2/43	4.7	FET 0.708
Ribs		9/558	1.6	3/455	0.4	χ^2=1.9469
Clavicle		0/68	0.0	4/90†	4.4	FET 0.135
Humerus	Distal	1/65	1.5	1/118	0.8	FET 1.000
	Shaft	1/72‡	1.4	0/45	0.0	FET 1.000
Radius	Proximal third	1/70	1.4	0/85	0.0	FET 0.452
	Distal	1/54	1.9	1/105	1.0	FET 1.000
Hamate		1/39	2.6	1/34	2.9	FET 1.000
Metacarpals 1-5		2/296	0.7	1/75	1.3	χ^2=0.3227
Femur	Middle third	1/82	1.2	0/133	0.0	FET 0.381
Tibia	Middle third	0/96	0.0	1/125	0.8	FET 1.000
Fibula	Middle third	0/88	0.0	1/85	1.2	FET 0.491
Metatarsals 1-5		1/237	0.4	0/284	0.0	FET 0.455
Tibial Contusion	Diaphysis	2/96	2.1	1/106	0.9	FET 0.605

Note: * Right and left sides combined, sexes combined, adults only. A=affected, O=observed, C=cervical, L=lumbar, FET=Fisher's Exact Test (two-tailed probability). † Two of these clavicle fractures are equivocal. ‡ This humerus fracture is equivocal. **Bold** indicates statistical significance (α=0.10).

Green 1975, Roberts 1988). For example, the clavicle is often fractured in a fall on the shoulder because of its unique position as a brace between the humerus and sternum. The distal radius is also commonly fractured in a fall because of the instinctive tendency to reach out with the arm to "break" the fall.

These observations are supported in a definitive analysis of long bone fractures in the large Amerindian sample from Libben (Lovejoy and Heiple 1981). The highest projected fracture rates (per 1000 individuals) were calculated in the clavicle (115), radius (108), and fibula (70). Thus, fracture of the clavicle, radius, and fibula are likely to be found in any human population which is leading an active physical lifestyle, and are found among the skeletal remains of Ban Chiang and Non Nok Tha.

The highest frequency of fracture (by element) in both samples is spondylolysis of the fourth and fifth lumbar vertebrae. In addition to spondylolysis, which is deemed a traumatic injury related to chronic physical stress on the back, the cervical vertebral fractures at Ban Chiang (possible "shoveler's fractures), and the presence of two fractures of the cervical vertebrae in the Non Nok Tha sample (one facet, one lamina), are suggestive of loads being applied to the head/neck. The large number of clavicle fractures at Non Nok Tha is in part because of two equivocal fractures which may be the result of childhood fractures or birth injuries, eliminating these two instances, the frequency of clavicle fracture is halved. At Ban Chiang, as well, there were instances of possible childhood fracture of the clavicle in two subadults. In individuals surviving well into childhood, these fractures are likely to be completely remodelled and present only as a suggestion of asymmetry.

At Ban Chiang, the individuals with fractures are evenly distributed in the Early and Late Groups, although there is an apparent clustering in the EP IV - MP VI time zones. At Non Nok Tha, nine individuals with trauma are from the MP4 division (52.9%) with the remainder dispersed across the remaining periods. Thus, at both sites, there is an apparent clustering of traumatic injury at the transitional time periods.

Traumatic injury in the Khok Phanom Di skeletal series is discussed only in passing (Tayles 1992:188-189), without the benefit of a suggested diagnosis or element count frequencies, consequently comparison can only be brief. No traumatic injuries to the skull are found. A single case of possible traumatic osteoarthritis of the knee (female) is described, with no additional pathology noted. Probable fractures are noted in eight individuals (five males and three females). In the males, fracture of the right fourth and fifth metatarsals, possible fracture of the proximal interphalangeal joint of the hand, fracture of the left fifth metacarpal and a tibial contusion are noted. Two females have healed fractures of the midshaft of the clavicle, both on the left; as well as another individual with a fracture of the fourth metacarpal. These fractures are not inconsistent with those reported in the northeastern Thai skeletal samples, but the presence of large long limb bone fractures in the latter sites are suggestive of more risk.

In order to evaluate the relative occurrence of these fractures, frequencies in the northeastern Thai long limb bones are compared graphically with the large Amerindian series from Libben, Ohio (Lovejoy and Heiple 1981), as well as a skeletal sample of free-ranging gorillas (Lovell 1990) [Figure 6.18]. The latter sample is included as a population which may fight each other, but which does not wage war. The lack of a recognizable pattern of element affected, site, size and shape of lesion (Walker 1989); as well as lack of sex specificity (i.e. young males), and lack of temporal clustering. all support the conclusion that neither site exhibits the prevalence or distribution of fractures which are suggestive of interpersonal violence or warfare. The majority of fractures detected are typical of accidental injury.

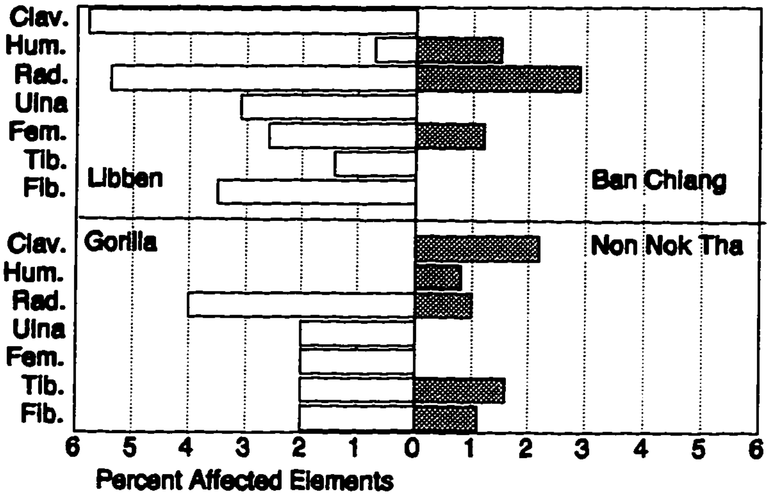


Figure 6.18. Comparative Fracture Frequencies
After Lovell 1990, Lovejoy and Heiple 1981

The presence of substantial amounts of angulation and overlap in many of the fractures, as well as the pseudoarthrosis of the mid-shaft clavicle fracture in the Non Nok Tha sample, is consistent with a general absence of knowledge of reducing and "setting" fractures (Roberts 1988, Lovejoy and Heiple 1981).

INFECTIOUS LESIONS

Skeletal lesions suggestive of infection are uncommon in both of these skeletal series (Table 6.40), and lesions in subadults are rare (one individual in the Ban Chiang sample). In many cases in these two skeletal samples, the only observations of lesions of infectious origin are found on incomplete bones, and by current suggested methods of "by individual" reporting, these would be ignored (Lovejoy and Heiple 1981, Buikstra and Ubelaker 1994). While further analysis and refinement of the data might enable the calculation of a "per individual" frequency, the complicity of incomplete skeletons, fragmentary skeletal elements, etc. is unlikely to generate any more meaningful numbers than those presented here (c.f. Waldron 1994).

Lesions of probable infectious origin noted in a single individual or a single element, are most likely to represent an isolated occurrence, rather than be suggestive of a population phenomenon. These are lesions of "frailty" or "hazard" - found in individuals more susceptible either by activity or genetics. An example of these kinds of lesions are found on the tibial shaft (3.2% of Ban Chiang tibiae, and 0.8% of Non Nok Tha tibiae), higher frequencies of lesions might suggest treponemal disease, e.g. affected tibiae frequencies ranging from 19-22% seen in Amerindian and Marianas Island skeletal samples (Rothschild and Rothschild 1996).

The outstanding differences between the two sites are the frequency of lesions of the temporal bone in the Ban Chiang sample, and lesions of the vertebral bodies in the Non Nok Tha skeletal series. The lesions of the temporal are of two types, one has an obvious opening in the outer cortex of the cranium at the suprameatal triangle. The other type consists of extremely enlarged mastoid processes, with no external pathology noted. These cases are suggested as possible sequelae of otitis media, a common childhood infection which may affect the pneumatization of the mastoid (Gregg and Steele 1982, Loveland et al. 1990).

The primarily osteolytic lesions of the vertebrae noted in the Non Nok Tha skeletal series are suggested to be the result of chronic granulomatous infection, such as in brucellosis or tuberculosis. While skeletal lesions are typically uncommon in these infections, when they occur the infections are slow, primarily lytic, result in very little osseous remodeling - in contrast to the exuberant callus formation of fracture healing, and typically target the vertebral centra rather than the lamina or facets (Ortner and Putschar 1981).

Table 6.40. Element Frequencies of Possible Infectious Lesions in Northeastern Thailand Adults

Element*		Ban Chiang		Non Nok Tha	
		A/O	%	A/O	%
Skull	Temporal bone	5/63	7.9	1/81	1.2
Ribs	Numbers 3 - 12	4/458	0.9	0/455	0.0
Vertebrae	T1-12	0/306	0.0	12/469	2.6
	L1-5	0/147	0.0	1/198	0.5
Ilium		2/46	4.3	2/50	4.0
Acetabulum		0/62	0.0	1/83	1.2
Hand Phalanges		1/481	0.2	0/655	0.0
Tibia	Shaft	3/95	3.2	1/125	0.8

Note: A=affected, O=observed, T=thoracic, L=lumbar. * Right and left sides combined, sexes combined, ribs counted by axial ends.

Brucellosis, contracted through contaminated milk, cheese, or the meat of infected goats, cattle or pigs, produces bone lesions which mimic tuberculosis, in two to 70% of cases. The primarily lytic, multiple lesions are noted in the lumbar and sacral spine and have little reactive bone formation. The disease affects adult males more often than females and is not usually seen in children. The vertebral lesions do not produce vertebral collapse (Brothwell 1991, Ortner and Putschar 1981). Very few cases of brucellosis have been proposed in archaeological material (Ortner and Putschar 1981).

Tuberculosis, is also a zoonoses, which may have originated with the water buffalo in the Far East (Fiennes 1978) as a mutation of a bovine bacillus, and is acquired from animal meat and milk. The disease is a chronic infection with the *Mycobacterium tuberculosis*, introduced either into the lungs or stomach, which may result in skeletal involvement in 3% of all cases. The most common skeletal lesion is found in the vertebral centrum (25-60%), typically the lower thoracic and lumbar levels, resulting in lytic cavitation and collapse (Ortner and Putschar 1981, Resnick and Niwayama 1981). The recovery of a single female in the Non Nok Tha series with complete collapse of the thoracic spine, suggests the presence of tuberculosis and requires evaluation of other lytic lesions present in the population. Although no spinal lesions are found in the Ban Chiang series, a single burial has active periostitis of the anterior borders of the lower left ribs suggestive of lung infection (e.g. fungal or bacterial), although not typically attributed to tuberculosis (Kelley and Micozzi 1984, Kelley and El-Najjar 1980, Molto 1990). No lytic lesions of the vertebral column are noted in the Khok Phanom Di skeletal series.

In a model simulation of tuberculosis infection, McGrath (1988a, 1988b) found that the effective population size, representing "the way in which a population is organized in terms of contact between group members", is the most crucial aspect of tuberculosis epidemic outcome (Ibid:494). In selecting a model outcome which preserves both the pathogen and the population, a range of 180-440 persons is the ideal effective population size. This number of persons is very likely to have been met by the populations of both Ban Chiang and Non Nok Tha, and the presence of trade items as well, suggests the possibility for intergroup transmission.

RECKONING

With this final review of the indicators of stress in the Ban Chiang and Non Nok Tha skeletal populations, as well as the details of each sample, the bio-archaeological model and the two hypotheses can be evaluated. Each of the hypotheses is addressed in turn, discussing the general aspects of the evidence presented. It is evident from the foregoing analysis that the Ban Chiang and Non Nok Tha samples are too different to be lumped together, and actually provide more interesting information when viewed as a continuum.

Hypothesis 1: The early inhabitants of northeast Thailand were generally healthy

The deciduous and permanent dental pathologies suggest both the Ban Chiang and Non Nok Tha skeletal series represent pre-agriculturists, with the implication of relative "health". Pathology in the deciduous teeth is restricted to the presence of localized hypoplasia of the canine, with very few linear hypoplasias noted. Deciduous caries are nearly always related to these hypoplastic enamel defects, typically found on the buccal or lingual surfaces of the tooth. Three permanent dental pathologies (premortem loss, caries, and abscessing) are also noted in frequencies less than 10% of the tooth sample, well below that suggested by the global evidence of agriculture. In contrast, calculus and dental attrition are high in both of these samples (especially Ban Chiang), and remain high over time, suggesting that the transition to softer, more processed food was not yet made, or that other functional or cultural uses of the teeth maintained the advanced attrition.

Dental enamel hypoplasia in the permanent teeth is also low in both of these samples, with the primary type being linear enamel hypoplasia (LEH), but with various types of pitting defects (single, linear and non-linear) also noted. As is typical in archaeological skeletal samples, the canines and incisors are most commonly affected, with a mean-age-at-occurrence in the canine teeth of approximately 4 years.

Mean stature in males is estimated at five feet five inches, and in females five feet, suggesting achievement of growth potential at both sites. Unfortunately, the small number of subadult diaphyses makes interpretation of childhood growth curves impossible.

The prevalence of both traumatic injury and infectious lesions is low in these series, although all evidence of pathology is not discussed here (e.g. tumors, congenital defects, anomalies, etc.). In the assessment of trauma, no patterns in elements affected, sex, age, temporal group, or site can be determined that would suggest systematic violence such as warfare. Although the majority of the fractures were united, and the individuals obviously lived well past the traumatic event, the presence of healed fractures which are angulated and shortened suggests there was little knowledge of fracture care or reduction. Among the possible infectious lesions, there is an apparent pattern of lytic lesions of the axial skeleton in the Non Nok Tha series which is suggestive of a "population phenomenon", such as tuberculosis.

The indicators of anemia; porotic hyperostosis of the vault and orbital roof, cranial vault thickening and enlarged nutrient foramina, are present in these northeastern Thai skeletal remains. Relative to the Khok Phanom Di sample, however, frequencies are low. There is no evidence of the active hyperostosis of the cranium which is typical in the textbook description of hemoglobinopathy; however, the very porous and fine nature of this pathological bone may have resulted in complete dissolution after interment. There is also no evidence of the metaphyseal disruptions that can occur (especially in the humeral head) in the thalassemias. These pathognomonic changes are noted in the Khok Phanom Di sample, along with observations of disruption of the pneumatization of the sinuses of the maxilla and frontal, and appendicular skeletal changes in several infants.

In the northeastern samples, there is evidence, in two infants, of porosity of the basilar skull elements, the *pars lateralis*, *pars basilaris*, and early death. As well, among the adults, several of the individuals exhibit cranial vaults which are thickened beyond one standard deviation of the mean, although the remodeled proportions of diplöe and cortex are below the clinical definition for pathological thickening. The presence of a small number of metatarsals with enlarged nutrient foramina is also suggestive of anemia. Whether this anemia is related to the presence of hemoglobinopathies, as predicted by Poolsuwan (1995), is equivocal. There are indications of osseous reaction beyond that seen in skeletal samples from non-malarial areas, but without evidence of the pathognomonic indicators, it is difficult to separate the more severe anemia of malaria from hemoglobinopathy. Genetic anemias are typically rare in the homozygous form, a state which precipitates early death either in utero or in early childhood (Stuart-Macadam 1992). Carriers of the trait (heterozygous) though, along with having some immunity to malarial infection, will manifest a physiological response on a scale of sliding severity. The very high childhood mortality/fertility in the Khok Phanom Di skeletal series is suggestive of severe stress in early life consistent with both epidemic malaria and hemoglobinopathy. But that demographic picture is noticeably absent from the Ban Chiang and Non Nok Tha samples.

The Non Nok Tha and Ban Chiang skeletal series represent only a fraction of the cemetery samples, and are known to be biased by differential mortality behavior (at the least), necessitating care in interpretation of the paleodemography. Both of these series, viewed as long term stationary populations, suggest relatively stable fertility and mortality. Using the fertility approach to paleodemography, the samples have an expected birth rate of approximately four, and have estimators similar to other stationary or slightly decreasing populations. The finding of a declining population is not unexpected, given the biases of the samples in which subadults are under-represented, but also in view of the effects of malaria and/or hemoglobinopathies on adult morbidity and mortality.

Hypothesis 2: There will be a decline in health over time

When the two sites are divided along temporal lines and examined relative to each other, it is evident that there is a loose continuum from the Early Group at Non Nok Tha, which includes material from the "neolithic" and early bronze era, to the Late Group at Non Nok Tha which is comparable to the Early Group at Ban Chiang, both being bronze age; and finally, the Late Group at Ban Chiang. While there is an increase in skeletal indicators of stress over time at both sites, it is important to recognize that the relative levels of the indicators remain low. So, even in the Late Group at Ban Chiang, the permanent dental pathologies are still reflecting a "pre-agricultural" pattern.

In the Non Nok Tha skeletal series, there is evidence for a significant increase in female stature in the Late Group, while male stature remains stable. Porotic hyperostosis of the cranial vault remains stable, but the prevalence of cribra orbitalia declines in the Late Group. Measurement of cranial vault thickness exhibits no significant change, although the number of individuals with thicknesses greater than one standard deviation above the mean are more common in the Early Group. The relative thickness of the diplõe to the cortex is greater in the Early Group crania, and more of the individuals with enlarged nutrient foramina of the metatarsals are from the Early Group. Thus, there is an apparent Late Group decline in several of the indicators of anemia in the Non Nok Tha sample. The evolution of a population-immunity to the causes of the anemia might explain this decline. However, there is no evidence of concomitant increase in fertility in the Late Group at Non Nok Tha, rather, the suggestion is of a decline in fertility and a decreasing population.

The prevalence of deciduous dental pathology shows little change over time, although all indicators increase slightly. Dental attrition exposing the dentin, and calculus formation are noted at a younger age in the Early Group. This, coupled with the increased prevalence of advanced attrition in the Late Group, suggests the possibility of changes in food characteristics, mouthing or weaning behaviors.

In the adult permanent dentitions, there is an overall increase in premortem tooth loss, caries, alveolar resorption, calculus and attrition. Only the prevalence of abscessing remains the same over time. Although the increases are noted in both sexes, generally a greater increase is found in female teeth/sockets than in males. An increase in these dental pathologies is predicted by the transition to agriculture, with the inclusion of progressively larger amounts of starchy foods, and appear to be affecting the females more than the males at Non Nok Tha. Advanced dental attrition exhibits an enigmatic change, with a decline in female teeth, while there is an increase in male teeth contributing to the overall increase. The prevalence of dental enamel hypoplasia is noted to decline in both males and females in the Late Group at Non Nok Tha, but there is no change in the distribution of age-at-occurrence data.

The prevalence of osteoarthritis also shows an increase over time in Non Nok Tha adults. Advanced appendicular osteoarthritis is noted at a younger age in the Early Group, but there is a temporal increase in advanced osteoarthritis in males, and a decline in females. There is no obvious change in the pattern of joints affected. In the axial skeleton, there is no change in osteoarthritis of the temporo-mandibular joint, and a decline is found in osteoarthritis of the occipital-cervical complex. Overall, osteoarthritis of the cervical, thoracic and lumbar vertebrae increases over time, but there is a larger increase in the prevalence of vertebral centra osteophytosis than in osteoarthritis of the articular facets. These increases predominately affect male vertebral elements.

Observations of traumatic injury are noted throughout the temporal sequence at Non Nok Tha, occurring in a random pattern suggestive of accidental injury. On the other hand, evidence of infectious disease, including possible tuberculosis, appears to cluster in the Late Group. Tuberculosis is an illness which is highly infectious, especially among young adults and the old, and contributes to high morbidity and mortality.

In the Ban Chiang skeletal sample, the trend of increasing indicators of stress is continued, although there is no change in stature over time. The indicators of anemia are generally stable as well. The number of adult individuals affected with cribra orbitalia increases in the Late Group, but there is no change in the subadult prevalence, the frequency of porotic hyperostosis of the vault, or vault thickness measurements. The number of individuals with thickness measurements greater than one standard deviation above the mean is greater in the Early Group, as is the number of metatarsals affected with enlarged nutrient foramina.

In the deciduous teeth, no temporal changes are noted in the prevalence of caries or the localized hypoplasia of the primary canine (LHPC). There is a shift in LHPC from predominately mandibular canines to predominately maxillary canines in the Late Group. Dental attrition exposing the dentin, and the presence of calculus are noted to occur at an older age in the Late Group, suggesting changes in the pattern of weaning/mouthing behaviors or in the available food resources.

In the permanent teeth, there is a general stability in the prevalence of premortem tooth loss, caries, abscessing, alveolar resorption and attrition over time. However, there are interesting sex differences, including an increase in caries in female teeth, coupled with a decline in abscessing, calculus and attrition. This suite of changes perhaps implies an increase in softer, stickier foodstuffs in the Late Group, which may have been more available to females than to males. In the male teeth, there is an increase in abscessing and an increase in attrition, the latter a cause of the former, which suggests the increase or maintenance of functional or cultural uses of the teeth contributing to increased wear. Dental enamel hypoplasias of the permanent teeth exhibit no statistically significant changes over time, but there is a suggestion of a peak age-at-occurrence which is older in the Late Group.

As predicted by the model, osteoarthritis of the appendicular and axial skeleton increases in the Late Group at Ban Chiang, an increase which, although present in both sexes, is greater in males than females. In the axial skeleton, there is no change in osteoarthritis of the temporo-mandibular joint or the occipital-cervical complex. In the articular facets and end-plates of the vertebral column, there is an increase in the male facets in every division, with a relatively greater increase in osteoarthritis of the end-plates than the facets.

No patterns in the occurrence of traumatic injuries suggestive of warfare are noted in the Ban Chiang remains, although there is a suggestion of a clustering of cases around the transition period. As well, more of the cases of possible infectious disease occur in the Late Group. There are no lytic lesions of the vertebral column such as those noted in the Non Nok Tha sample, but there is a single individual with active periostitis of the internal border of ribs, which suggests pulmonary infection. The most common infectious lesions in the Ban Chiang series affect the temporal bone.

There is a greater prevalence of all of the indicators of stress in the Ban Chiang skeletal series relative to the Non Nok Tha series, and there is a further increase over time in the majority. The presence of a larger number of individuals with enlarged nutrient foramina of the metatarsals, and cranial vaults with maximum thickness (more than one standard deviation above the mean), in the Early Group might suggest the progressive adaptation of the population to the local parasites, or manipulation of the environment against the parasite, but the evidence is far from overwhelming. The suggestion that paddy rice agriculture eliminates suitable habitat for the malaria vector (Poolsuwan 1995) might also be supported by the stability of the indicators of anemia in the Ban Chiang sample and the decline in anemia indicators in the Non Nok Tha sample.

Thus, there is an increase in the majority of skeletal stress indicators over time, reflecting a relative decline in "health" in the Non Nok Tha and Ban Chiang skeletal series, as supposed in the second hypothesis. However, the prevalences of these indicators remain low compared to other populations experiencing a similar transition toward increased sedentism, such as Amerindians, and even the coastal population at Khok Phanom Di. It is also worthy of note that in general, the indicators of stress are much less prevalent in the Non Nok Tha sample than in the Ban Chiang sample, suggesting that the environmental differences between the two sites may be exerting more influence than the technological similarities.

CHAPTER 7: SUMMARY AND CONCLUSIONS

Two human skeletal samples from northeastern Thailand, Non Nok Tha and Ban Chiang, provide a much needed look at the lifeways and possible stressors of inhabitants of the region from the premetal, bronze age, and iron age poriods (approximately 3rd millennium B.C. to early 1st millennium A.D.). These skeletal samples span several settlement patterns and economic transitions reconstructed from regional archaeological research, including movement from small, semi-sedentary hunter-gatherer-cultivators residing in the foothills, to sedentary cultivator/agriculturists.

Global analyses of human skeletal remains have generated a bio-archaeological model of increasing indicators of stress, suggested to represent declining health, with the "domestication" of humankind. The shift toward agriculture theoretically results in an increase in most of the dental indicators of stress (caries, hypoplasia, calculus and resorption), with the exception of dental attrition, and the variable polarity of premortem tooth loss and abscessing. Sedentism allows the domestication of animals, which might imply a constant supply of good quality protein, but also results in an increased zoonoses contact. Sanitation, water quality, and the breadth of food resources typically decline. Infectious disease, including parasitism, increases because of water and sanitation problems as well as crowding and a decline in nutrition. Traumatic injury and osteoarthritis may decline as a result of a more sedentary lifestyle, or patterns of injury and osteoarthritis may change, reflecting differing work loads.

This model suggests two hypotheses which have been addressed in the analysis of the skeletal samples from northeast Thailand: 1) The early inhabitants of this region are "healthy" or demonstrate low levels of the indicators of stress, and 2) There is evidence of a decline in health, or an increase in the frequency of the skeletal indicators of stress, over time which is consistent with a change in settlement and subsistence patterns.

NON NOK THA

The skeletal sample from Non Nok Tha, excavated in 1966 and 1968, comprises 180 individuals. Slightly more than one-quarter are under the age of 20 years, suggestive of under-representation of subadults. The adult sex ratio is skewed toward females (60 : 67). Two peaks in subadult deaths are present, one at age 3-5 years and the second at age 5-10 years. In adults, the largest number of male deaths occur at 35-40 years, and female deaths at 35-45 years. Paleodemographic estimators suggest the population was stationary or slightly decreasing, with estimated fertility at 3-4 children.

Stature estimations yield a male mean stature of 165.4 cm (5'5") and female mean stature of 153.4 cm (5'¼"). The permanent dental samples have low (i.e. less than 10% of teeth/sockets) frequencies of caries, premortem tooth loss, abscessing, advanced alveolar resorption, and advanced attrition, consistent with a pre-agricultural economy. Advanced calculus formation is more common and may be attributable to a cultural factor such as betel-nut chewing. Frequencies of pathology in the deciduous teeth are similarly low. The predominant hypoplastic defect in the deciduous teeth is localized hypoplasia of the primary canine (LHPC). Dental enamel hypoplasias, most commonly the horizontal linear defect, occur in low frequencies in the adolescent permanent teeth (14.5%), and adult teeth (7.9%), supporting low levels of physiological stress affecting dental development.

The indicators of anemia suggest that anemia was present, but frequencies are relatively low in the Non Nok Tha population. Cribra orbitalia is absent in subadults, and is present in 11.3% of adult orbits. Healed porosis is noted in one-third of the adult calvaria examined. Means of cranial vault thickness, are greater in males (range 4 - 12 mm) than females (range 4 - 11 mm). The diplöe:cortex ratios are greatest in the subadult crania, suggesting hematopoietic activity, but no values exceed the clinical definition for anemia. Enlarged nutrient foramina of the metatarsals, a possible indicator of marrow hyperplasia, are noted in four individuals.

Advanced osteoarthritis is uncommon. In the appendicular skeleton, the elbow, wrist, and ankle are the most frequently affected joints, while osteoarthritis in the axial skeleton exhibits the common pattern of increasing prevalences from the cervical vertebrae to the lumbar elements. No evidence of trauma was found in the Non Nok Tha subadults. Evidence of traumatic injury, including cranial, rib, vertebral and long limb bone fractures; tibial contusion, and secondary osteoarthritis, are observed in 15 adults (seven females, eight males). Four individuals exhibit trauma to more than one element. Except in the case of spondylolysis (a fracture of the vertebral arch), and one non-united midshaft clavicle fracture, all fractures are healed and remodeled. "Per element" frequencies are all less than 8.0%. There are no patterns of elements affected, site on the bone, sex, or age that would suggest the practice of warfare.

The most common lesion of suspected infectious origin is noted in the vertebrae of four adults, including a female with complete fusion and collapse of seven thoracic elements. The primarily lytic nature of the defects, with little reactive bone formation, vertebral centrum collapse, and the levels targeted are all suggestive of tuberculosis infection. Other infectious lesions include circular, lytic lesions of the auricular surface; perforation of the temporal bone in the suprameatal triangle, suggestive of mastoiditis or residua of otitis media; and small, localized active periostitis of the distal tibia.

Evaluation of the skeletal indicators of stress using the complete Non Nok Tha sample implies an economy consistent with a semi-nomadic, hunter-gatherer-cultivator lifestyle, and therefore "health".

Change Over Time

The Non Nok Tha sample may be divided into two temporal sub-samples: the Early Group (EP 1-3, MP 1-3) which includes skeletal remains from the "pre-metal" levels and the earliest levels in which bronze is found (3500-2500 BC); and the Late Group (MP 4-8) which includes the largest number of contemporaneous burials, and evidence of affiliative ranking (2500-1000 BC).

Each of these group sub-samples contains 83 individuals, but the Early Group has representation of all age intervals except neonate, while the Late Group sample is missing children aged birth to three years, a distribution which is unlikely to be real and is probably caused by sampling error and/or differential burial practices. As expected with these paleodemographic distributions, estimators document a decreasing fertility in the Late Group, with a declining Mean Childhood Mortality, Juvenile:Adult Ratio, and the complementary increasing 20+/5+ ratio.

While many of the skeletal indicators of stress show a trend toward increasing frequencies over time, statistically significant differences addressed here are not universal, suggesting a cautious interpretation may be in order. While the frequencies of the majority of the dental indicators of stress at Non Nok Tha remain in the realm of a hunter-gatherer-cultivator economy over time, there is evidence of a shift away from a coarse/fibrous diet toward starchy/sweet foodstuffs. This trend is reflected in increased frequencies of premortem tooth loss, periodontal disease, and dental caries, along with a younger age-at-occurrence. The frequency of dental abscessing remains statistically stable. There is no change in the frequencies of caries, hypoplasia or slight calculus in the deciduous teeth; but the youngest age of dentin exposure, age two years in the Early Group and age three in the Late Group, may reflect a shift in weaning foods, or changes in mouthing behavior or objects.

As expected, the frequency of osteoarthritis of both the appendicular and axial skeleton increases over time. The pattern of prevalence by functional unit in the appendicular skeleton remains the same, but there is an increase in osteoarthritis in the cervical and thoracic elements of the spine suggestive of some change in activity. Observations of trauma in the Non Nok Tha remains are distributed across both the Early and Late Groups, with a clustering in the MP 4 which may reflect a larger sample of skeletal remains, or an increase in traumatic injury at a transitional period.

In contrast to the model prediction which proposes a decline in dental attrition with advancing technology in food processing, advanced attrition in Non Nok Tha adult teeth increases slightly over time, perhaps the result of cultural/functional uses of the dentition. Dental enamel hypoplasia prevalences are predicted to increase with increasing sedentism and the adoption of agriculture, but the frequency declines in the Late Group permanent teeth, with no obvious change in the age-at-occurrence.

As well, the indicators of anemia do not follow the predicted trend. The majority of burials with measured vault thicknesses greater than one standard deviation above the mean, as well as those individuals with enlarged nutrient foramina of the metatarsals, are found in the Early Group. There is also a decrease in the frequency of cribra orbitalia in the Late Group at Non Nok Tha, along with a decline in the mean diplõe thickness. These unexpected trends might be interpreted as evidence of improving health, resulting from a decline in the causes of anemia, reflecting habitation alteration; a decrease in susceptibility to anemia, as would be expected in the face of a steadily accumulating population frequency of thalassemia; or, recognizing the intricate relationship of nutrition, anemia and infection; these decreases may reflect a change in the status of the interred individuals in the Late Group at Non Nok Tha.

BAN CHIANG

The two seasons of excavation at Ban Chiang were conducted near the center of the village mound, which is presumed to have functioned much as it does today: a cluster of stilt houses, domesticated animals sheltered beneath, surrounded by small garden plots and areas of specialized use (e.g. pottery firing or metal working). The 140 individuals recovered include three fetal remains, 35 subadults (less than 15 years of age), seven adolescents and 95 adults. As at Non Nok Tha, the recovery of subadults falls at the low end of the expected range for a cemetery sample. The mortality distribution exhibits a high number of subadult deaths at 3-4.9 years and 5-9.9 years. Male deaths cluster at 45-50 years, while female deaths peak at 35-40 years. Paleodemographic estimators suggest the population is stationary or slightly decreasing and fertility is estimated at four children. Mean stature estimates in adult males 165.7 cm (5' 5") and females 154.1 cm (5' ½") are relatively tall.

Deciduous dental pathologies are uncommon, LHPC is the most frequent dental enamel hypoplasia. Adult permanent teeth also exhibit low frequencies (i.e. under 10% of teeth observed) of premortem loss, caries, abscessing and linear enamel hypoplasia. Advanced attrition and periodontal disease are slightly more common.

The indicators of anemia, cribra orbitalia (24.6% of all orbits) and healed vault porosis (41.2%) are more common in the Ban Chiang series than at Non Nok Tha. Cranial vault thickness mean measurements are typically larger in males at the suture lines, and larger in females at the frontal and parietal eminences. Enlarged nutrient foramina of the metatarsals were noted in seven individuals.

Osteoarthritis affects slightly more than half of all appendicular articular surfaces, with the articular facets of the wrist, elbow, ankle and feet most commonly affected. In the axial skeleton, osteoarthritis affects one-quarter of the temporo-mandibular joint surfaces, is common in the surfaces of the occipital-cervical complex, and increases toward the lumbar spine.

Evidence of traumatic injury is noted in 22 individuals from the Ban Chiang series (13 males, seven females, and two subadults). All fractures are healed, but the presence of significant angulation and shortening suggests the absence of knowledge of fracture reduction. One adult male may exhibit a peri-mortem fracture of the frontal bone. The lack of patterns in element, site, shape, or sex and the absence of the typical fractures of interpersonal violence suggest the traumatic injury seen here is accidental. Lesions suggestive of infection are observed in 11 individuals (seven males, three females, and one infant). The most common lesion is a smooth-walled opening of the temporal bone in the region of the suprameatal triangle which is suggestive of a childhood ear infection. Other lesions are noted on the distal tibial shaft, hand phalanx, and the anterior border of the lower left ribs reflecting possible pulmonary infection.

All of the indicators of stress are greater in the Ban Chiang skeletal series than in the Non Nok Tha remains, a finding consistent with the more nucleated habitation and more prolonged mortuary sequence of the Ban Chiang site (3rd millennium B.C. to early 1st millennium A.D.). Still, the prevalences of these indicators remain low with respect to "agricultural" skeletal samples, and thus imply "health".

Change Over Time

The Ban Chiang skeletal sample is divided into Early and Late Groups at the EP IV and EP V interface. Changes in some aspects of mortuary behavior (grave orientation) suggest a transition at this point, and faunal evidence supports environmental changes consistent with more intensive rice agriculture in the Middle Periods. The Early Group sample (2500-1600 BC) contains 61 individuals across all the age intervals while the larger Late Group sample (1600 BC - AD 300), 79 individuals, is missing adults aged 50+ years. Paleodemographic estimators suggest a decline in fertility in the Late Group, associated with a decline in Mean Childhood Mortality and a declining Juvenile:Adult ratio.

As is predicted by the model, the indicators of stress in the Early and Late Groups at Ban Chiang demonstrate a trend toward increasing frequencies, but few of the indicators exhibit statistically significant temporal change. Significant differences in the Ban Chiang temporal sub-samples are found in the deciduous dental attrition, which declines in prevalence, and is observed at an older age in the Late Group (age four instead of age two), suggestive of a shift toward softer/less coarse food stuffs or changes in weaning/mouthing behaviors. In the adult permanent teeth, the frequency of advanced calculus declines over time. A significant change is also observed in the prevalence of osteoarthritis of the occipital-cervical complex which decreases in the Late Group. However, osteoarthritis of the articular facets and vertebral end-plates of the cervical, thoracic and lumbar regions of the spine increases in the Late Group, although no apparent shift in the levels is observed.

While the trend toward increasing indicators of stress over time at Ban Chiang is predicted by the model, the absence of statistically significant increases is puzzling. The skeletal samples may simply be too small to effectively mirror the trends, the samples may not be divided in an optimum manner, or alternatively, agricultural intensification has not occurred, and/or the economy continues to be broad-ranging enough to mitigate the effects of sedentism.

SEX DIFFERENCES

Two kinds of significant sex differences are noted in the northeastern Thai skeletal samples, the first in the overall prevalence of these indicators, and the second in variation in change over time. In the Non Nok Tha sample, all of the permanent dental pathologies (except caries) are more common in male teeth than in female teeth. Caries and premortem tooth loss are noted at a younger age in females, while abscessing and advanced attrition are noted at a younger age in males. The mean age-at-occurrence of hypoplasia of the canine teeth is younger in males than in females. At both sites, osteoarthritis of the appendicular and axial skeleton is more common in males than females.

The presence of a sexual division of labor might suggest differential access to food resources during the transition toward intensified agriculture, resulting in sex differences in temporal trends. This difference is evident in the Non Nok Tha sample where stature, caries, advanced alveolar resorption, and advanced calculus all increase in females over time and are stable or decrease in males. Advanced dental attrition declines over time in female teeth, while it increases in male teeth. These changes are consistent with an increase in soft, sweet/starchy foods, coincident with an increase in total calories, which may be initially differentially accessible to females.

In the Ban Chiang adult dental sample, while prevalences of abscessing, advanced resorption, and advanced dental attrition are greater in males than females, abscessing and advanced calculus are observed at a younger age in females. Over time, there is an increase in abscessing in male tooth sockets consistent with an increase in advanced attrition, but in the female sample, there is a decline in abscessing, advanced calculus and advanced attrition in the Late Group, perhaps reflecting differential access to a diet richer in carbohydrates than males.

BAN CHIANG AND NON NOK THA

Comparison of the two sites, in toto, demonstrates statistically significant differences in nearly every skeletal indicator examined. This suggests that although the samples do overlap in time, they are not necessarily comparable because of differences in environment, ecology, settlement density and/or technology. When the samples were compared by temporal group, a loose continuum became evident which persisted throughout the analysis. The Early Group at Non Nok Tha consistently demonstrated the lowest prevalences of all indicators, while the Non Nok Tha Late Group and Ban Chiang Early Group exhibited parallels, and the highest frequencies were found in the Ban Chiang Late Group.

At both sites and at all time periods, the prevalences of the indicators of skeletal stress are relatively low, consistent with "pre-agricultural" communities elsewhere, and supportive of the first hypothesis: the early inhabitants of northeast Thailand are "healthy". The samples are not without evidence of hard work and substantial risk of injury, in the form of uniform presence of osteoarthritis, and the occurrence of fractures of the vertebrae, skull, and long limb bones.

Anemia was present in the ancient inhabitants of Non Nok Tha and Ban Chiang and likely impacted their morbidity and mortality. Although there are tantalizing suggestions, the absence of pathognomonic changes prohibits the declaration of the presence of thalassemia. Malaria is supposed to have been present during the occupation of these sites, and the suggestion of tuberculosis infection in the Late Group at Non Nok Tha, offers another contributor to the "parasite load" of the populations.

The second hypothesis, that there will be a decline in health over time, is also upheld, although less obviously. While there is a general increase in the indicators of stress through time at Non Nok Tha, the interpretation is complicated by two observations. There is evidence of possible differential access to food resources between males and females over time which, although it results in an increase in female dental pathologies, also results in an increase in stature. Additionally, in contrast to the model, there is a decline in the indicators of anemia over time reflecting either; a decline in the causes of the anemia, perhaps a result of landscape change; a decline in susceptibility to anemia, influenced by increasing frequencie of genetic anemia or change in status; or small sample error.

Evaluation of the evidence of a temporal decline in health at Ban Chiang is also enigmatic, suggesting rather, that there is relative stability over time, with a trend toward increased skeletal indicators of stress. If the Ban Chiang series is viewed as later in technological time relative to Non Nok Tha, i.e. farther along in the process of intensified agriculture, then there is unequivocal evidence of increased indicators of stress suggestive of a decline in health.

CONCLUSIONS

The bio-archaeological model, first used to document a decline in human health with the advent of sedentism and agriculture, provides an appropriate framework for discussion of biological change in the pre-metal, bronze and iron age periods of northeastern Thailand. However, the Non Nok Tha and Ban Chiang skeletal samples do not conform explicitly. For example, while the samples are contemporaneous, and share similar technological accomplishments, the skeletal indicators of stress exhibit statistically significant differences. Sex differences in the prevalence of the majority of indicators, as well as variation in the degree and direction of change over time, suggests gender distinctions in the effects of agriculture. The pace of change is slower in these skeletal series than in other populations at the transition to agriculture; although there is a trend toward increasing indicators of stress in both samples, the temporal increases are not statistically significant. Similarly, the contrast in frequencies of indicators of stress between the two sites is greater than the temporal differences within each site.

These findings do not detract from the value of the model as a standard of expectation against which unanticipated results can be measured. Data from Non Nok Tha and Ban Chiang fill a gap in the steadily accumulating database of global analyses of skeletal indicators of stress which suggests:

> "Biological changes did not occur uniformly within populations adopting agriculture. Rather, segments of past societies were affected differentially. . . . Finally, the shift to agriculture and associated biological changes in general show worldwide variability, suggesting that dietary changes and accompanying hard-tissue alterations may have been configured by highly localized circumstances." (Larsen 1995:204).

Some of this variability may be attributable to the differential effects of sedentism versus agriculture, a distinction which awaits further research.

The heterogeneity exhibited by the skeletal indicators of stress in the Non Nok Tha and Ban Chiang skeletal samples, reflects an evolving interpretation of the archaeological evidence of Southeast Asia: "...there was a marked enduring localism evident in material culture, ritual, and social practices between 2000 and 200 B.C." (White 1995:105). This notion of localism suggests that, rather than anticipating uniformity between contemporaneous skeletal samples (part of the initial proposal for this research), emphasis should be placed on the diversity and its potential causes.

Thus, explanation of the marked contrasts between the northeastern Thailand samples and the coastal sample of Khok Phanom Di, requires more detailed comparisons, additional analyses, and incorporation of not only environmental, but "material culture, ritual and social" factors as well. Continued research and comparisons to other extant (i.e. Ban Kao, Ban Na Di, Na Pla Kluay, etc.) and future skeletal collections is likely to provide an interpretation of the health and lifeways of the prehistoric people of Thailand which is as complicated as the regional chronology.

APPENDIX A: RESULTS OF SUBADULT SEXING AND AGING METHODS

SUBADULT SEXING

There are 45 subadults from Ban Chiang (BC) and Non Nok Tha (NT) with measurements of one or more deciduous teeth (Tables A.1-A.2). Of these, calculations using one or more of the De Vito and Saunders (1992) discriminant function equations for sex estimation, could be made in 21 cases. Sex estimations could be made in an additional seven individuals by substituting the antimere measurements for any missing data. When substituting the antimere still left missing values so that no equation could be solved (n=10 individuals), mean measurements were used (calculated using the combined sex sample). Mean measurements were substituted so that less than half of the required variables in an equation were mean measurements.

Because the published data were divided into three different groups prior to obtaining the discriminant function results, although there are 12 final equations, some duplicate variables (with a change in the constant), and these estimates should be treated as a single result. Review of the discriminant function equations (Table 3.2) shows that equations #1 and #2; equations #3 and #4; and equations #7, #8, and #9, use the identical variables. There are no individuals with discrepancies in the values for the latter group of equations using the mandibular deciduous canine. However, there are two individuals each, with discrepancies in the two other groups of equations. Burial NT2-14 and BC2-54 have discrepancies between equations #3 and #4; while Burials BC2-52 and BC2-70 have discrepancies between equations #1 and #2. Regardless of the sign, the largest of the values is selected to represent the results of that equation and the smaller number is ignored.

In seven individuals the sex estimation results were mixed, i.e. some equations generated positive results and others negative results (highlighted in bold in Tables A.1 and

A.2). Most of these individuals (5/7) had more complete dentitions, so that all twelve of the equations could be utilized. In general, in these cases of mixed results, the equations using maxillary deciduous teeth alone (#4, 5, 6), and equation #11 which adds the permanent maxillary first molar, gave positive results (sex male), while the other equations gave female results. In these cases, while the final determination cannot be known, assignment of a sex estimate based on the majority results of the consolidated eight equations, assignment based on the size of the estimate, or alternatively, preferential assignment using results from equations with more variables (in descending order: Equation 10, 1 or 2, 3 or 4, 5, 11 and 12) can be done.

As an example, Burial NT2-72, has mixed results for nine of the equations. Equations #1 and #2, counting as one result, are negative; equations #3 and #4 (counting as one result) are positive; equations #5 and #6 are both positive; while equations #7, #8 and #9 (counting as one result) are negative. That gives three positive results and two negative results, and, using the majority determination, yields a sex estimate of male. Burial BC2-54 has discriminant function results in ten of the equations with a tie between positive and negative results (3+/3-). In this case, examination of the quantities, shows that the negative numbers are larger than the positive ones, suggesting sex is female; alternatively, choosing equations which use a larger number of variables (i.e. #2, #3) also suggests female sex.

The presence of discrepancies between the formulae in those individuals with many teeth, introduces the possibility of error in those individuals with fewer solutions, and makes interpretation of the results more difficult. Explanation for these discrepancies include: a) the individual falls within the overlapping "tails" of the bimodal distribution, b) sexual dimorphism in the deciduous teeth of these ancient Thai is greater in different tooth classes than those used in the Burlington Growth Study, c) there is less sexual dimorphism in the Thai deciduous teeth, or d) the Thai teeth have larger overall dimensions, making the Burlington Growth Study constants too small to result in discrimination.

The results of application of the discriminant function equations are added to the morphognostic characteristics of the mandible and ilium in Tables A.3 and A.4 to document the components of the final sex estimates in the subadults from the two Northeast Thailand skeletal samples. The final sex determination was based upon sex estimation of the majority of indicators with some subjective weighing of the morphological characteristics of the mandible and ilium over the dental discriminant functions because of the problems of discrepant values.

SUBADULT AGING

The multiple criteria used to age subadults from Ban Chiang and Non Nok Tha are summarized in Tables A.5 - A.7. In general, as with dental eruption criteria; epiphyseal fusion, diaphyseal length measurements, and measurements of the *pars* bones of the cranium, *etc.*, result in very broad estimates of age. Age estimates in subadults, within a skeletal sample or related skeletal series, would benefit from a multiple criteria seriation method similar to that proposed for adult age estimation (Lovejoy et al. 1985).

Specific results on calcification criteria (Demirjian et al. 1973 and Moorrees et al., 1963a, 1963b) applied to specific Ban Chiang burials are presented in Tables A.9 and A.10. Radiographs on subadult dentitions were required for these analyses, and none were available for Non Nok Tha subadults.

Table A.1. Results of Deciduous Dental Sexing Calculations in Non Nok Tha Subadults (Sectioning Point 0: >0 male, <0 female)

Burial No.	Discriminant Function Equation Number												Sex
	1	2	3	4	5	6	7	8	9	10	11	12	
1-7							-0.325	-0.332	-0.347			-0.023	F
1-29						1.611							M
1-35						0.872†							M†
1-44A										0.083†		-0.670†	?F†
1-46						-1.403*	-1.400*	-1.397*					F*
1-57							-0.972	-0.973	-0.977			-0.128*	F
1-79							-1.126*	-1.125*	-1.127*				F*
1-84							-1.649	-1.644	-1.637				F
2-2							0.567	0.553	0.523				M
2-5						0.892†							M†
2-14	-0.839	-1.204	-0.228	**0.078**	**0.189**	**0.736**	-2.234	-2.224	-2.207				?F
2-15	-1.034	-1.034	-1.037				-1.034*	-1.034*	-1.037*				F
2-34						0.725†					0.318†		M†
2-36						-1.832†							F†
2-72	-0.590	-1.379	**0.044**	**1.253**	**1.370**	**1.975**	-1.957	-1.949	-1.937				?M
2-81				0.166*	0.160*	0.353*					0.812*		M*
2-96						-2.461							F
2-112	-0.441*	-0.309*	-0.190*	-0.669*	-0.603*	-0.408*	-0.449	-0.454	-0.467				F*
2-125						0.019†							M†

Source: De Vito and Saunders 1990. * Discriminant equation calculated substituting antimere measurement. † Discriminant equation calculated substituting mean measurement. "1-XX" indicates 1966 burial, "2-XX" indicates 1968 burial. **Bold** highlights mixed results. See text for discussion of interpretation.

Table A.2. Results of Deciduous Dental Sexing Calculations in Ban Chiang Subadults (Sectioning Point 0: >0 male, <0 female)

Burial No.	Discriminant Function Equation Number												Sex
	1	2	3	4	5	6	7	8	9	10	11	12	
1-38							-2.819	-2.803	-2.777			-2.283	F
1-40							-0.356	-0.362	-0.377				F
1-43A				0.221	0.222	0.328							M
2-5			-1.555			-0.996	-2.050	-2.041	-2.027				F
2-8	-1.692*	-2.278*	-1.140*	-0.129	-0.011	**0.484**	-3.220*	-3.200*	-3.167*				?F*
2-12						1.494†							M†
2-13							0.537	0.522	0.493			0.802	M
2-14							-2.973*	-2.956*	-2.927			-1.739*	F*
2-16	-1.256†	-1.575†		-0.441†	-.0440†	-0.436†							F†
2-21						0.790†							M†
2-26	1.146*	0.996*	1.486*	1.305	1.352	1.674	0.229*	0.217*	0.193*	1.327*	1.440*	1.038*	M*
2-38				1.751	1.891	2.600					1.852		M
2-44	-2.626*	-2.981*	-2.235*	-1.407*	-1.284*	-0.966*	-3.220	-3.200	-3.167		-1.030*		F*
2-52	0.059	**-0.640**	0.500	1.573	1.621	2.050	**-2.635**	**-2.620**	**-2.597**		1.020		?M
2-54	-0.775	-1.164	-0.464	**0.176**	**0.232**	**0.511**	-1.588	-1.583	-1.577		**1.020**		?F
2-62	-1.987	-2.221	-1.173	-1.188	-1.011	-0.305	-2.327	-2.315	-2.297	-0.571	-0.222	-1.329	?F
2-70	0.175	**-0.357**	0.339	1.397	1.440	1.612	**-1.341**	**-1.339**	**-1.337**				?M
2-80	-0.337†	-0.578†		**0.238†**	**0.214†**	**0.087†**							M†

Source: De Vito and Saunders 1990. * Discriminant equation calculated substituting antimere measurement. † Discriminant equation calculated substituting mean measurement. "1-XX" indicates 1974 burial, "2-XX" indicates 1975 burial. **Bold highlights mixed results.** See text for discussion of interpretation.

Table A.3. Summary of Sexing Criteria in the Non Nok Tha Subadult Skeletal Sample

Site/Burial No.	Age (years)	Mandible‡			Ilium‡				Dental Discriminant Functions†	Final Sex Estimate
		Chin Form	Arcade Shape	Gonion Eversion	Notch Angle	Notch Depth	Arch	Blade Curve		
NT1-7	6-8	M	F	F	M	F	F		F	F
NT1-14	0.5-1.5				F	F	F	?M		F
NT1-29	2-3				F				M	?F
NT1-35	2-3	M	M	F					M*	M
NT1-44A	8-9	M	F	M	M	M	M		?F*	M
NT1-46	3-4	M			M		M		F*	M
NT1-57	3-4	M	M	M	M	M	M		F	M
NT1-58	6-8				F	F	F			F
NT1-74	8-10	F	F	F						F
NT1-79	3-4	M	M						F*	M
NT1-84	1-1.5	F	F						F	F
NT2-2	5-6								M	?M
NT2-5	6-7	F		M					M*	?M
NT2-8	1.5-2			F						F
NT2-12	.75-1	M	M	M	M	F	M			M
NT2-14	2-3	F	F	F	M	M	M	M	?F	M
NT2-15	3-4	F	F	F					F	F
NT2-16	1-1.5	M	F	F	F	F	F	F		F

Table A.3 (cont'd). Summary of Sexing Criteria in the Non Nok Tha Subadult Skeletal Sample

Site/Burial No.	Age (years)	Mandible‡			Ilium‡				Dental Discriminant Functions†	Final Sex Estimate
		Chin Form	Arcade Shape	Gonion Eversion	Notch Angle	Notch Depth	Arch	Blade Curve		
NT2-25	9-11	M	M	M						M
NT2-29	7	F	M	F	M	M	M	M		M
NT2-34	7-8				M		M		M*	M
NT2-35	3-5	F		F						F
NT2-36	5-6				F	F	F	F	F*	F
NT2-46	.25-.75				M	M	M	M		M
NT2-72	3-4	F	M	M					?M	M
NT2-81	3-4	F	F	F	F	F	F	F	M*	F
NT2-82	1-1.5		F	F						F
NT2-87	NB				F	F	F			F
NT2-94	1-1.5				M		M			M
NT2-96	4-5								F	F
NT2-112	3-5	M	M	F	M	M	M		F*	M
NT2-116	12-14	F	F	F						F
NT2-121	.75-1	M	M	M	M	M	M			M
NT2-125	3-5				M	M	M		M*	M

‡ Shutkowski 1993. † De Vito and Saunders 1990. * Discriminant function results generated substituting antimere or mean measurement. "1-XX" indicates 1966 burial, "2-XX" indicates 1968 burial.

Table A.4. Summary of Sexing Criteria in the Ban Chiang Subadult Skeletal Sample

Site/Burial No.	Age (years)	Mandible‡			Ilium‡				Dental Discriminant Functions†	Final Sex Estimate
		Chin Form	Arcade Shape	Gonion Eversion	Notch Angle	Notch Depth	Arch	Blade Curve		
BC-38	6-7		M	M	M	M	F	M/F	F	M
BC-40	2-3				F	M	F	F	F	F
BC-42	3-5	M	M	M	M	M	M			M
BC-43A									M	?M
BCES-5	5-6	M	M	M	M	M	M		F	M
BCES-8	2-3	M	F	F	F	F	F	F	?F*	F
BCES-12	.75-1				M	M	M	F/M	M*	M
BCES-13	1-1.5	M	M		M	M	M	?F	M	M
BCES-14	1-1.5				F	M	F		F*	F
BCES-16	6-9	M	M	M	M	M	M	M	F*	M
BCES-21	6-8	F	M	F					M*	?F
BCES-26	3-5	F	M	M	F	M	F	F	M*	F
BCES-38	3.5-4.5				M	M	M	M	M	M
BCES-43	NB				M	M	M	M		M
BCES-44	2-4	M	F	F	F	F	F	F	F*	F
BCES-44B'					F	F'	F			F
BCES-48	NB				F	F	F			F
BCES-52	6-7	F	M	M	M	M	M	M	?M	M

Table A.4 (cont'd). Summary of Sexing Criteria in the Ban Chiang Subadult Skeletal Sample

Site/Burial No.	Age (years)	Mandible‡			Ilium‡				Dental Discriminant Functions†	Final Sex Estimate
		Chin Form	Arcade Shape	Gonion Eversion	Notch Angle	Notch Depth	Arch	Blade Curve		
BCES-54	3-4	F	F	F	M	F	F	M	?F	F
BCES-55	14-16	M	M	M	?M					M
BCES-60	.75-1.5				M	M	M	M		M
BCES-62	5-7								F	?F
BCES-63	fetus			M	M	M	M			M
BCES-64	fetus				F					F
BCES-66	fetus				F		F	F		F
BCES-70	3-4	M	M	F					?M	M
BCES-77	0-1 m				F	F	F	F		F
BCES-80	3-5	F	F	F					M*	F

‡ Shutkowski 1993. † De Vito and Saunders 1990. * Discriminant function results generated substituting antimere or mean measurement.
BC=1974 series, BCES=1975 series.

Table A.5. Summary of Aging Criteria in Ban Chiang Subadults: Fetal to Age 7 Years

Burial No.	Dental Eruption	Epiphy Fusion	*Pars basilaris*			*Pars lateralis*		Tymp. Ring	Diaphyseal Length*						
			L	W	Age	L	Age		Hum	Rad	Ulna	Fem	Tib	Fib	Age
1-1A	1.5-3														
1-14	5-7														
1-34A	9 m														
1-36	2-4	<4	18	18	B-3m	29	3m								
1-38	6-7	5-8						>5		125.5					3.5-6
1-40	2-3	<6	21	23	6-12m	38	1-3		111	87.5	98				1-2
1-42	4											171			1.5-2.5
1-43A	6-9m							B-6m							
1-46	6-9m														
1-49														>170	2.5-4.5
1-52	6														
1-53	2-4														
2-4	9-12m	<4						1-2.5							
2-5	6-7	5-6							165	129	145				3.5-6
2-8	1.5-3.5	>2	22		1-1.5	39	2-3	1-2.5	113.5	91.5	103.5	154			1-2.5
2-12	9m	9-12m				35	6-18m	1-2.5	91	71	82	116	95.5	90	6m-1
2-13	12-18m							>2.5	102			128	107	100	9m-1.5
2-14	12-18m	6-18m	21	20	3-12m	40	3-5	1-2.5	103						9m-1.5
2-16	9m		21	22	6-12m	35	6-18m	>2.5	96	80	91	107	104.5	99.5	6m-1.5
2-21B	6-8							>2.5				265			4.5-7
2-26	3-5					40	2-5	>2.5	154	122		213	180.5	176	2.5-4.5

Table A.5 (cont'd). Summary of Aging Criteria[a] in Ban Chiang Subadults: Fetal to Age 7 Years

Burial No.	Dental Eruption	Epiphy Fusion	*Pars basilaris*			*Pars lateralis*		Tymp. Ring	Diaphyseal Length*						
			L	W	Age	L	Age		Hum	Rad	Ulna	Fem	Tib	Fib	Age
2-38	3.5-4.5		?23		18m			>2.5	137.5	105.5	120	196			2-3.5
2-43			17	18	B-3m								77		B-6m
2-44	2-4		22	20	3-12m	38	1.5-3	>2.5	107	85					9m-1.5
2-44A	2-3	<6	22	25	1.5-2										
2-48		NB	15	16	9.5Fm	24	F-B	F-B	66	53		74	66	62	B-1m
2-50I	2-3														
2-52	6-7	5-7	25	28	2-5			>2.5	160	131.5	143	229	194.5	190.5	3.5-6
2-54	3-4		23	26	1.5-3			>2.5	147	123	137	208			2.5-5.5
2-60	9m	<3								82					9m-1.5
2-62	6-7							>2.5	145		128	206.5			2.5-4.5
2-63		NB						B	59			67			
2-64							B	B-6m	62			71			
2-66						16	8Fm		41		42	50		42	7-8Fm
2-67		>3			<4			>2.5							
2-70	3-4		22	24	1-1.5			>2.5	129						1.5-2.5
2-77	NB	NB	14	14	10Fm				66	54		77			B-3m
2-80	3-5							1-2.5			116				2-4

Note: Interpretation from Faseka and Kósa 1978, Hoffman 1979, Krogman and İşcan 1986, Redfield 1970, Ubelaker 1989, Weaver 1980. * Mean of right and left sides. "1-XX" indicates 1974 series, "2-XX" indicates 1975 series. L=length, W=width, NB=newborn, B=birth, m=months, Fm=Fetal months. All measurements in mm.

Table A.6. Summary of Aging Criteria in Non Nok Tha Subadults: Fetal to Age 7 Years

Burial No.	Dental Eruption	Epiphy Fusion	*Pars basilaris*			*Pars lateralis*		Tymp. Ring	Diaphyseal Length						
			L	W	Age	L	Age		Hum	Rad	Ulna	Fem	Tib	Fib	Age
1-7	6-8	>4						>2.5							
1-14													105		6m-1
1-22A		<4							135						1.5-3
1-29	2-4		21	24	1-1.5			>2.5	117						1-2
1-35	2-4		21	21	6-12m	40	1.5-3								
1-36	3-4	>3	25		2-3	44	4-5	>2.5	140						2-3.5
1-46	3-4									108		143			1-1.5-3
1-57	2-3							>2.5			89*	131			.5-1.5
1-79	3-4														
1-83	1-2								95						.5-1
1-84	18m														
2-2	5-6				>4		5-6	>2.5		132					3.5-6
2-7A	8-9Fm												53		8.5-9Fm
2-8	1.5-2														
2-12	9-12m							1-2.5				100*	86*		3-6m
2-14	3-4	<6	21	25	1-2				133	100	117				1.5-3
2-15	3-4	3-4													
2-16	12-18m	<4													
2-35	3-4				<4			>2.5							
2-36	5-6							>2.5	150	115	128				2.5-4.5

Table A.6 (cont'd). Summary of Aging Criteria[a] in Non Nok Tha Subadults: Fetal to Age 7 Years

Burial No.	Dental Eruption	Epiphy Fusion	*Pars basilaris*			*Pars lateralis*		Tymp. Ring	Diaphyseal Length						
			L	W	Age	L	Age		Hum	Rad	Ulna	Fem	Tib	Fib	Age
2-40									>46						>7Fm
2-46	6m							0-6m	81			104			B-6m
2-70A	4.5-5Fm				<6			>2.5	29						4.5-5Fm
2-72	3-4														
2-77											>75				>6m
2-81	3-5	<4		26	1.5-2	37	1.5-3	>2.5	146.5						2.5-4
2-82	1-1.5	<6	20	21	3-6m	37	1.5-3	>2.5							
2-86A									63			73			9.5-10Fm
2-87								NB							
2-91															F
2-94	12-18m							B-6m	96						.5-1
2-96	5-6		24	27	1.5-3	39	2-5	>2.5							
2-112	4		24	26	1.5-3	40	2-5	>2.5	145	117	128	194	166	164	2.5-4.0
2-121	9m-1		19	20	3-6m	38	2-5	B-6m	96	78	87	124.5	103		.5-1
2-125	3-4		24*	>26	1.5-3	44	4-5	>2.5	>142						>2-3.5

Note: Interpretation from Faseka and Kósa 1978, Hoffman 1979, Krogman and İşcan 1986, Redfield 1970, Ubelaker 1989, Weaver 1980. * Mean of right and left sides. "1-XX" indicates 1966 series, "2-XX" indicates 1968 series. L=length, W=width, NB=newborn, B=birth, m=months, Fm=Fetal months. All measurements in mm.

Table A.7. Summary of Aging Criteria in Non Nok Tha Subadults: 7 - 18 Years

Burial No.	Dental Eruption	Epiphyseal Fusion							Diaphyseal Length							
		Vert	Sho	Elb	Inno	Hip	Kne	Ank	Hum	Rad	Ulna	Fem	Tib	Fib	Age*	Age†
1-44A	8-9	7-16	<15	<14	<14	<13	<14	<12	201	156	166				7-9	7-9
1-56		7-16					<14	14-15					313	302	9-12+	15
1-58	7-8		<14	<14	<14	<14			182			275			5-7.5	6-10
1-61													>145	>147	3-5	>3
1-64			<14	<14							171		240	240	6-9	7-10
1-74	8-10	17-23														
2-5	6-7	4-7														
2-25	9-11						>3									
2-29	7	4-7	<14	<14			<14	<14		113			171		2.5-5	4-5
2-34	8	7-23	<14	<14		<14				159		280			5.5-8	6-10
2-51						<14	>3							212	4.5-7.5	6-8
2-80						<15	<15	13-16					322	304	9.5-12+	17
2-116	15-18	7-23	<15	<14		<13	<14	<16				377				11-16

Note: Interpretation from Hoffman 1979, Krogman and İşcan 1986, Ubelaker 1989. * Hoffman 1979. † Ubelaker 1989. "1-XX" indicates 1966 series, "2-XX" indicates 1968 series.

Table A.8. Summary of Aging Criteria in Ban Chiang Subadults: 7 - 18 Years

Burial No.	Dental Eruption	Epiphyseal Fusion							Diaphyseal Length							
		Vert	Sho	Elb	Inno	Hip	Kne	Ank	Hum	Rad	Ulna	Fem	Tib	Fib	Age*	Age†
1-10	11-13	>7	<15	<14					233						7.5-11.5	10-12
1-11		<23			17-23											
1-25	12-15			<14	<15	13-17										
1-29							<16	14-16								
2-55	<18	6-16	<15	14+	13+	<16	<16	<16	269	236		400	333	329	11-12+	17-18
2-58	18-20	<23														

Note: Interpretation from Hoffman 1979, Krogman and İşcan 1986, Ubelaker 1989. * Hoffman 1979. † Ubelaker 1989. "1-XX" indicates 1974 series, "2-XX" indicates 1975 series.

Table A.9. Tooth Calcification Scores in Selected Ban Chiang Subadults (Demirjian et al. 1973)

Burial	BC-40 (♀)		BC-42 (♂)		BCES-5 (♂)		BCES-8 (♀)		BCES-44 (♀)		BCES-52 (♂)		BCES-54 (♀)		BCES-62 (♀)	
Tooth	Stage	Score	Stage	Score	Stage	Score	Stage	Score	Stage	Score	Stage	Score	Stage	Score	Stage	Score
M2	0	0.0	0	0	D	10.1	0	0	D	11.1	D	10.1	C	6.9	D	4.5
M1	D	4.5	D	8.0	F	12.3	D	4.5	0	0.0	F	12.3	D	4.5	F	14.2
P4	0	0.0	A/0	1.7	C	5.4	0	0.0	A	1.8	C	5.4	C	6.5	C	6.5
P3	A	0.0	A	0	D	7.0	B	0.0	A	0.0	C	3.4	D	7.5	C	3.7
C	D	3.8	D	3.5	E	7.9	C	0.0	C	0.0	D-E	5.7	D	3.8		
I2	D	3.2	D	3.2	F	7.8			D	3.2	E	5.2	E	5.6		
I1	D	0.0	D	0	G	8.2	D	0.0	D	0.0	F	4.1	E	2.4		
Total		11.5		16.4		50.8		4.5		16.1		46.2		37.2	>	28.9
Age	<3		3.7-3.8		7.2-7.3		<3*		3.3-3.4		6.9-7.0		5.9-6.0		>5*	

Note: BC=1974 series, BCES=1975 series. Mandibular permanent teeth (M=molar, P=premolar, C=canine, I=incisor), ♀ Female, ♂ Male. * Less than seven teeth scored.

Table A.10. Tooth Calcification Scores in Selected Ban Chiang Subadults (Moorrees et. al., 1963a)

Burial Number	Sex*	Tooth†	Stage‡	Mean Age	SD	Age Estimate
BC-40	?F	M1	Crc	2.25	1.75-3	2.25
BC-42	?M	M1	Crc-Ri	2.75	1.5-3	3.5
		P3	Coc	4.25	3.5-5.25	
BCES-5	?M	M1	R½	5.25	4.5-6.5	5.25
		P3	Crc	5.25	4.25-6.5	
BCES-8	?F	dm1	Ac	1.75	1.25-2.25	1.5-2
		dm2	R½-¾	1.5-2	1.25-.25	
BCES-44	?F	dm1	R¾	1.1	0.75-1.5	1.4
		dm2	R½	1.5	1-2	
		M1	Cr¾	1.6	1-2	
BCES-52	?M	dm2	>Ac-<Res		4-5.5	5
		M1	R½	5	4-6.5	
BCES-54	?F	M1	Ri	2.75	2-4.5	2.75-4.75
		M2	Cr¾	4.75	4-6	
BCES-62	?F	M1	R½	5.25	4-6.5	5.25-5.5
		M2	Cr¾	5.5	4.5-7	

Note: BC=1974 series, BCES=1975 series. * Sex M=male, F=female; † Tooth dm=deciduous molar, M=permanent molar, P=permanent premolar. ‡ Calcification stage Cr=crown, R=root.

APPENDIX B: SUMMARY TABLES

Table B.1 Abridged Life Table for Burials from Ban Chiang, Thailand

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-4.9	5	25	18.24	100.0	0.1824	454.4	0.0401	2921.2	29.21
5-9.9	5	8	5.84	81.76	0.0714	394.2	0.0148	2466.8	30.17
10-14.9	5	2	1.46	75.92	0.0192	376.0	0.0039	2072.6	27.30
15-19.9	5	7	5.11	74.47	0.0686	359.6	0.0142	1696.6	22.78
20-24.9	5	8.49	6.19	69.36	0.0893	331.3	0.0187	1337.0	19.28
25-29.9	5	12.49	9.11	63.16	0.1443	293.0	0.0311	1005.7	15.92
30-34.9	5	7.49	5.46	54.05	0.1011	256.6	0.0213	712.7	13.18
35-39.9	5	20.65	15.07	48.59	0.3101	205.3	0.0734	456.1	9.39
40-44.9	5	14.65	10.69	33.52	0.3188	140.9	0.0759	250.8	7.48
45-49.9	5	21.65	15.79	22.84	0.6917	74.7	0.2115	109.9	4.81
50-60	10	9.65	7.04	7.04	1.0000	35.2	0.2000	35.2	5.00
Total		137.1							

Explanation:

x = Age interval in years
n_x = Width of age interval x
D_x = Actual numbers of observed deaths at age x
d_x = Number of individuals dying at age x, based on a cohort of 100
l_x = Survivorship at age x
q_x = Mortality rate or probability of dying at age x
L_x = Number of years lived between age x and $x+1$
m_x = Age specific death rate for age interval x
T_x = Total number of years lived beyond age x
e^o_x = Expectation of life at age interval x (life expectancy)

NOTE: 40 adults of non-specific ages (19 males, 19 females, 2 ?sex) are evenly distributed.

Table B.2. Age and Sex Distribution of the Burials from Ban Chiang by Group

Interval	Early Group (EP I-IV)				Late Group (EP V - LP X)			
	Male	Female	?Sex	Total	Male	Female	?Sex	Total
Fetal	1	2		3				
N.B.-0.9	1	2	3	6	2		1	3
1 - 1.9	1			1	1	1		2
2 - 2.9		1		1			1	1
3 - 3.9	1	2	1	4			2	2
4 - 4.9	1		1	2		2	1	3
5 - 5.9					1			1
6 - 6.9	2	1	1	4			1	1
7 - 7.9						1		1
8 - 9.9			1	1				
10 - 11.9								
12 - 14.9	1			1			1	1
15 - 19.9	1		1	2	2	2	1	5
20 - 24.9		1		1		3		3
25 - 29.9	3	2		5		3		3
30 - 34.9	1			1	1	1		2
35 - 39.9	3	2		5	4	5		9
40 - 44.9	3	2		5	2	1		3
45 - 49.9	5	2		7	6	2		8
≥50	1	2		3				
Adult	2	1	1	4	4	6	1	11
Young					2	5		7
Mid-aged	1	4		5	10	3		13
TOTAL	28	24	9	61	35	36	8	79

Table B.3. Abridged Life Table for Ban Chiang Early Group (EP I - IV) Burials

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-4.9	5	14	24.14	100.00	0.2414	439.7	0.0549	2810.3	28.10
5-9.9	5	5	8.62	75.86	0.1136	357.8	0.0241	2370.7	31.25
10-14.9	5	1	1.72	67.24	0.0256	331.9	0.0052	2012.9	29.94
15-19.9	5	2	3.45	65.52	0.0526	319.0	0.0108	1681.0	25.66
20-24.9	5	1	1.72	62.07	0.0278	306.0	0.0056	1362.1	21.94
25-60	35	35	60.34	60.34	1.000	1056.0	0.0571	1056.0	17.50
Total		58							

Source: Jackes 1992.
Explanation: x = Age interval in years
n_x = Width of age interval x
D_x = Actual numbers of observed deaths at age x
d_x = Number of individuals dying at age x, based on a cohort of 100
l_x = Survivorship at age x
q_x = Mortality rate or probability of dying at age x
L_x = Number of years lived between age x and x+1
m_x = Age specific death rate for age interval x
T_x = Total number of years lived beyond age x
e^o_x = Expectation of life at age interval x (life expectancy)

Table B.4. Abridged Life Table for Ban Chiang Late Group Burials (EP V- LP X)

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-4.9	5	11	13.92	100.00	0.1392	465.2	0.0299	3288.0	32.88
5-9.9	5	3	3.80	86.08	0.0441	420.9	0.0090	2822.8	32.79
10-14.9	5	1	1.27	82.28	0.0154	408.2	0.0031	2401.9	29.19
15-19.9	5	5	6.33	81.01	0.0781	389.2	0.0163	1993.7	24.61
20-24.9	5	3	3.80	74.68	0.0508	363.9	0.0104	1604.4	21.48
25-60	35	56	70.89	70.89	1.0000	1240.5	0.0571	1240.5	17.50
Total		79							

Source Jackes 1992. Explanation: See Table B.3.

Table B.5. Summary of Estimated Stature in Ban Chiang Males

Burial ID.	Age	Stature (N=39 males) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
BC 6	Middle age	148.0±8.0 153.3±7.7 153.6±6.6	4'10" 5'0" 5'0"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
BC 9	Middle age	173.7±8.3 169.7±7.6 174.0±6.8	5'8" 5'7" 5'8"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
BC 12	Middle age	174.3±10.3 171.5± . 173.3±7.4	5'8" 5'7½" 5'8"	*	Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
BC 18	Middle age	155.1±8.0 157.8±7.7 159.2±6.6	5'1" 5'2" 5'2"	*	Non-ethnic Thai-Chinese Mongoloid	Right femur " " " "
BC 20	35-40	170.7±4.0 170.7±4.0 173.0±3.2	5'7" 5'7" 5'8"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
BC 23	45-50	175.0±5.0 168.7± . 173.7±4.6	5'8¼" 5'6½" 5'8"		Non-ethnic Thai-Chinese Mongoloid	Right ulna Right radius " "
BC 26	Middle age	164.9±5.9 161.5±6.0 166.9±4.6	5'5" 5'3" 5'6"	*	Non-ethnic Thai-Chinese Mongoloid	Left tibia " " " "
BC 32	30-40	152.5±7.4 156.2±7.3 157.2±6.3	5'0" 5'1" 5'2"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
BC 35	40-50	162.2±4.9 163.6± . 166.3±4.3	5'3½" 5'4½" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
BC 39	35-40	167.7±10.3 167.2± . 169.4±7.4	5'6" 5'5¾" 5'7"	*	Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
BC 43	35-40	167.8±4.5 165.9±5.4 169.3±3.8	5'6" 5'4¾" 5"7"		Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
BC 44	40-45	169.2±9.3 165.1±8.8 177.4±7.3	5'6½" 5'4¾" 5'9"	*	Non-ethnic Thai-Chinese Mongoloid	Left tibia " " " "
BC 50	Adult	170.0±9.6 . 165.6±9.1 170.5±7.2	5'6" 5'5" 5'7"	*	Non-ethnic Thai-Chinese Mongoloid	Right tibia " " " "

Table B.5 (cont'd). Summary of Estimated Stature in Ban Chiang Males

Burial ID.	Age	Stature (N=39 males) Cm.	Stature (N=39 males) Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
BCES 2	35-40	160.9±4.1 161.2±4.2 163.8±3.2	5'3½" 5'3½" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Left fibula " " " "
BCES 6	40-45	161.8±5.0 163.3± . 166.0±4.3	5'3½" 5'4¼" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
BCES 7	45-55	163.1±5.0 164.2± . 166.8±4.3	5'4¾" 5'4"¾" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left humerus " " " "
BCES 22	Middle age	173.1±4.1 170.1±4.2 172.0±3.2	5'8" 5'7" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Left fibula " " " "
BCES 24	30-35	175.0±4.2 170.0±4.5 173.5±3.3	5'8" 5'7" 5'8"		Non-ethnic Thai-Chinese Mongoloid	Right tibia " " " "
BCES 25	Middle age	165.3±5.0 162.8± . 166.9±4.7	5'4¾" 5'4" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Right ulna " " " "
BCES 31	45-50	161.3±4.0 162.2±4.1 165.5±3.8	5'3½" 5'3½" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur " " " Left femur
BCES 35	45-50	166.4±5.0 166.4± . 168.7±4.3	5'6" 5'5½" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left humerus " " " "
BCES 36	45-50	169.5±5.0 165.9± . 170.0±4.7	5'7" 5'5¼" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Right ulna " " " "
BCES 39	Young adult	162.9±4.0 164.8±4.0 167.9±3.2	5'3½" 5'4¾" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Right fibula
BCES 40	45-50	172.7±4.1 169.8±4.2 171.8±3.2	5'8¼" 5'7" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Right fibula " " " "
BCES 42	40-45	170.0±9.0 167.3±8.3 171.1±7.1	5'7" 5'6" 5'7"	*	Non-ethnic Thai-Chinese Mongoloid	Right femur " " " "
BCES 45	45-50	170.1±4.2 165.8±4.5 169.6±3.3	5'7" 5'4¾" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Right tibia " " " "

Table B.5 (cont'd). Summary of Estimated Stature in Ban Chiang Males

Burial ID.	Age	Stature (N=39 males) Cm.	Stature (N=39 males) Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
BCES 47	45-50	165.9±4.0 166.8±4.0 167.9±3.2	5'4¾" 5'6" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Right fibula
BCES 49	35-40	165.3±4.1 163.0±4.0 163.4±3.2	5'4¾" 5'3½" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Right fibula
BCES 49A	45-50	168.8±9.3 164.7±8.8 169.7±7.0	5'6½" 5'4½" 5'7"	*	Non-ethnic Thai-Chinese Mongoloid	Right tibia " " " "
BCES 50	25-30	170.1±4.0 171.2±4.0 173.7±3.2	5'7" 5'7" 5'8"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
BCES 51	40-45	168.4±4.1 166.7±4.2 168.9±3.2	5'6" 5'6" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Right fibula " " " "
BCES 53	Adult	157.1±4.9 160.3± . 163.3±4.3	5'2¼" 5'3" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
BCES 56	Adult	160.1±4.0 161.1±4.1 160.2±3.2	5'3½" 5'3½" 5'3½"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur " " " Right fibula
BCES 65	40-45	160.7±4.0 161.7±4.1 160.7±3.2	5'3½" 5'3½" 5'3½"		Non-ethnic Thai-Chinese Mongoloid	Right bicond. femur " " " Left fibula
BCES 71	Young adult	168.4±4.2 164.4±4.5 168.7±3.3	5'6" 5'4¾" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left tibia " " " "
BCES 72	35-40	165.6±4.0 166.2±4.0 167.0±3.2	5'4¾" 5'6" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
BCES 73	35-40	171.5±4.9 169.7± . 171.6±4.3	5'7" 5'6¾" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
BCES 76	25-30	162.3±4.0 163.0±4.0 164.8±3.2	5'3½" 5'3½" 5'4½"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
BCES 78	Middle age	164.3±5.0 161.3± . 165.9±4.6	5'4¾" 5'3½" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Right radius " " " "

Table B.5 (cont'd). Summary of Estimated Stature in Ban Chiang Males

Burial ID.	Age	Stature (N=39 males) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
BCES 79A	Adult	180.0±4.5 173.7±5.4 179.0±3.8	5'10¾" 5'8" 5'10¾"		Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
MEAN[3]/ S.D.	N=29 N=29 N=29	166.8±5.4 165.7±3.6 168.3±4.2	5'6" 5'5¼" 5'6"		Non-ethnic Thai-Chinese Mongoloid	
Range		157.1-180.0 160.3-173.7 160.2-179.0	5'2"-5'11" 5'3"-5'8" 5'4"-5'11"		Non-ethnic Thai-Chinese Mongoloid	

1 An asterisk (*) denotes stature is derived from long limb bone length estimated from segment measurements (Steele 1970).

2 Non-ethnic stature formulae (Sjøvold 1990). Thai-Chinese-Chinese stature formulae, no standard error estimates for upper limb bones (Sangvichien et al. 1985, nd). Mongoloid stature formulae (Trotter 1970).

3 Mean and range do not include statures estimated from segment measurements.

Table B.6. Summary of Estimated Stature in Ban Chiang Females

Burial ID.	Age	Stature (N=32 females)		Seg	Regression Formula[2]	Side/Bone(s)
		Cm.	Ft./In.			
BC 2	Young adult	155.7±6.58 149.5±5.67	5'1¼" 4'10¾"	*	Non-ethnic Thai-Chinese	Left tibia " "
BC 4	17-20	150.8±6.8 149.2±5.2	4'11" 4'11"	*	Non-ethnic Thai-Chinese	Left femur " "
BC 8	35-40	151.9±4.1 149.9±3.0	4'11¾" 4'10¾"		Non-ethnic Thai-Chinese	Left fibula Right femur
BC 11	17-20	153.4±4.9 154.1± .	5'½" 5'		Non-ethnic Thai-Chinese	Left humerus " "
BC 15	Adult	157.3±4.1 152.3±3.5	5'2" 5'0"		Non-ethnic Thai-Chinese	Left fibula Right tibia
BC 16	20-30	160.6±5.5 158.4± .	5'3" 5'2¼"	*	Non-ethnic Thai-Chinese	Right humerus " "
BC 19	Young adult	152.0±8.8 154.7±7.3	5'0" 5'1"	*	Non-ethnic Thai-Chinese	Left humerus " "
BC 21	Adult	153.1±6.6 154.7±5.8	5'0" 5'1"	*	Non-ethnic Thai-Chinese	Left tibia " "
BC 27	25-30	153.4±6.6 155.0±5.8	5'0" 5"1"	*	Non-ethnic Thai-Chinese	Left tibia " "
BC 28	45-50	145.1±4.9 149.2± .	4'9" 4'10¾"		Non-ethnic Thai-Chinese	Left humerus " "
BC 31	50-60	161.5±4.2 154.7±3.5	5'3½" 5'1"		Non-ethnic Thai-Chinese	Left tibia " "
BC 34	40-45	160.9±5.0 153.5± .	5'3½" 5'½"		Non-ethnic Thai-Chinese	Left radius " "
BC 45	18-22	156.2±4.0 157.1±3.0	5'1" 5'2"		Non-ethnic Thai-Chinese	Right bicond. femur Right femur
BC 48	35-45	151.1±4.0 153.3±2.1	4'11½" 5'0"		Non-ethnic Thai-Chinese	Left bicondylar femur Right femur and tibia
BCES 1	18-22	149.8±7.3 148.3±5.6	4'10½" 4'10"	*	Non-ethnic Thai-Chinese	Right femur " "
BCES 3	Middle age	158.7±6.3 152.2±5.4	5'2½" 5'0"	*	Non-ethnic Thai-Chinese	Right tibia " "
BCES 9	35-40	158.4±5.0 151.3± .	5'2" 4'11½"		Non-ethnic Thai-Chinese	Left ulna Left radius
BCES 15	Adult	165.1±4.2 158.0±3.5	5'4¾" 5'2"		Non-ethnic Thai-Chinese	Right tibia " "

Table B.6 (cont'd). Summary of Estimated Stature in Ban Chiang Females

Burial ID.	Age	Stature (N=32 females) Cm.	Stature (N=32 females) Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
BCES 19	30-35	156.2±4.0 155.6±2.1	5'1" 5'1"		Non-ethnic Thai-Chinese	Right bicond. femur Right femur and tibia
BCES 20	35-40	164.8±5.0 156.7± .	5'4¾" 5'1¾"		Non-ethnic Thai-Chinese	Left ulna Left radius
BCES 27	35-40	159.4±4.9 157.7± .	5'2" 5'2"		Non-ethnic Thai-Chinese	Right humerus " "
BCES 28	35-40	146.5±4.9 150.0± .	4'9½" 4'11"		Non-ethnic Thai-Chinese	Right humerus " "
BCES 29	18-20	152.6±4.0 153.3±2.1	5'0" 5'0"		Non-ethnic Thai-Chinese	Left bicondylar femur " " "
BCES 30	20-25	152.3±4.0 152.5±2.1	5"0" 5'0"		Non-ethnic Thai-Chinese	Right bicond. femur " " "
BCES 33	25-30	165.6±4.1 161.0±3.5	5'4¾" 5'3½"		Non-ethnic Thai-Chinese	Left fibula Left tibia
BCES 34	25-30	158.9±4.0 157.7±2.1	5'2" 5'2"		Non-ethnic Thai-Chinese	Left bicondylar femur Left femur and tibia
BCES 41	Yg adult	151.7±4.0 151.7±3.0	5'0" 5'0"		Non-ethnic Thai-Chinese	Right bicond. femur Right femur
BCES 46	45-50	157.9±4.2 151.5±3.5	5'2" 5'0"		Non-ethnic Thai-Chinese	Left tibia " "
BCES 59	45-50	154.4±4.1 151.3±4.4	5'1" 5'0"		Non-ethnic Thai-Chinese	Left fibula " "
BCES 61	Middle age	161.6±5.0 154.0± .	5'3½" 5'¾"		Non-ethnic Thai-Chinese	Right radius " "
BCES 69	25-30	152.0±4.0 153.8±3.0	5'0" 5'0"		Non-ethnic Thai-Chinese	Left bicondylar femur Left femur
BCES 75	Young adult	154.8±4.9 154.9± .	5'1" 5'1"		Non-ethnic Thai-Chinese	Right humerus " "
BCES 79	Middle age	163.1±4.2 156.2±3.5	5'4¾" 5'1"	.	Non-ethnic Thai-Chinese	Right tibia " "
MEAN[3]/ S.D.	N=25 N=25	156.5±5.5 154.1±2.9	5'1" 5'¾"		Non-ethnic Thai-Chinese	
Range		145.1-165.6 149.2-161.0	4'10"-5'5" 4'10"-5'5"		Non-ethnic Thai-Chinese	

[1] An asterisk (*) denotes stature is derived from long limb bone length estimated from segment measurements (Steele 1970).

[2] Non-ethnic stature formulae (Sjøvold 1990). Thai-Chinese stature formulae, no standard error estimates for upper limb bones (Sangvichien et al. 1985, nd).

[3] Mean and range do not include statures estimated from segment measurements.

Table B.7. Hypoplasia in Permanent Teeth (<15 years) from Ban Chiang

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
MAXILLARY								
M3	2		0		0		2	
present	0	0.0					0	0.0
M2	2		0		2		4	
present	0	0.0			0	0.0	0	0.0
M1	7		7		1		15	
absent	7	100.0	6	85.7	1	100.0	14	93.3
horizontal line	0	0.0	1	14.3	0	0.0	1	6.7
P4	2		1		0		3	
present	0	0.0	0	0.0			0	0.0
P3	2		1		1		4	
absent	2	100.0	1	100.0	0	0.0	3	75.0
horizontal line	0	0.0	0	0.0	1	100.0	1	25.0
C	3		1		1		5	
absent	1	33.3	1	100.0	0	0.0	2	40.0
horizontal line	2	66.7	0	0.0	1	100.0	3	60.0
I2	3		2		1		6	
absent	1	33.3	2	100.0	1	100.0	4	66.7
horizontal line	2	66.7	0	0.0	0	0.0	2	33.3
I1	3		4		2		9	
absent	1	33.3	4	100.0	2	100.0	7	77.8
horizontal line	2	66.7	0	0.0	0	0.0	2	22.2
TOTAL MAXILLARY	24		16		8		48	
absent	18	75.0	15	93.8	6	75.0	39	81.3
horizontal line	6	25.0	1	6.2	2	25.0	9	18.7
MANDIBULAR								
M3	2		0		0		2	
present	0	0.0					0	0.0

Table B.7 (cont'd). Hypoplasia in Subadult Permanent Teeth (<15 years) from Ban Chiang

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
M2	2		0		0		2	
present	0	0.0					0	0.0
M1	7		4		2		13	
absent	7	100.0	3	75.0	2	100.0	12	92.3
horizontal line	0	0.0	1	25.0	0	0.0	1	7.7
P4	2		0		2		4	
present	0	0.0			0	0.0	0	0.0
P3	2		0		2		4	
present	2	100.0			1	50.0	3	75.0
horizontal line	0	0.0			1	50.0	1	25.0
C	2		1		2		5	
absent	0	0.0	1	100.0	0	0.0	1	20.0
horizontal line	2	100.0	0	0.0	2	100.0	4	80.0
I2	4		1		2		7	
present	0	0.0	0	0.0	0	0.0	0	0.0
I1	6		3		2		11	
present	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL MAND.	27		9		12		48	
absent	25	92.6	8	88.9	9	75.0	42	87.5
horizontal line	2	7.4	1	11.1	3	25.0	6	12.5
COMBINED JAWS								
Molars	22		11		5		38	
absent	22	100.0	9	81.8	5	100.0	36	94.7
horizontal line	0	0.0	2	18.2	0	0.0	2	5.3
Premolars	8		2		5		15	
absent	8	100.0	2	100.0	3	60.0	13	86.7
horizontal line	0	0.0	0	0.0	2	40.0	2	13.3

Table B.7 (cont'd). Hypoplasia in Subadult Permanent Teeth (<15 years) from Ban Chiang

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
Canines	5		2		3		10	
absent	1	20.0	2	100.0	0	0.0	3	30.0
horizontal line	4	80.0	0	0.0	3	100.0	7	70.0
Incisors	16		10		7		33	
absent	12	75.0	10	100.0	7	100.0	29	87.9
horizontal line	4	25.0	0	0.0	0	0.0	4	12.1
OVERALL	51		25		20		96	
absent	43	84.3	23	92.0	15	75.0	81	84.4
horizontal line	8	15.7	2	8.0	5	25.0	15	15.6

Note: A=affected, O=Observed. 10 individual burials are represented: 4 males, 4 females, 2 ?sex.

Table B.8. Hypoplasia Prevalence in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
MAXILLARY								
M3	23		18		0		41	
absent	23	100.0	17	94.4			40	97.6
horizontal line	0	0.0	1	5.6			1	2.4
M2	29		27		1		57	
absent	27	93.1	25	92.6	1	100.0	53	93.0
horizontal line	2	6.9	2	7.4	0	0.0	4	7.0
M1	28		27		2		57	
absent	27	96.4	27	100.0	2	100.0	56	98.2
hypocalcified	1	3.6	0	0.0	0	0.0	1	1.8
P4	31		37		2		70	
absent	26	83.9	35	94.6	2	100.0	63	90.0
horizontal line	2	6.5	2	5.4	0	0.0	4	5.7
hypocalcified	3	9.7	0	0.0	0	0.0	3	4.3
P3	32		31		2		65	
absent	26	81.3	28	90.3	2	100.0	56	86.2
horizontal line	2	6.3	1	3.2	0	0.0	3	4.6
vertical groove	2	6.3	0	0.0	0	0.0	2	3.1
non-linear pits	0	0.0	2	6.5	0	0.0	2	3.1
hypocalcified	2	6.3	0	0.0	0	0.0	2	3.1
C	26		32		2		60	
absent	18	69.2	25	78.1	0	0.0	43	71.7
horizontal line	4	15.4	2	6.3	2	100.0	8	13.3
vertical groove	1	3.8	0	0.0	0	0.0	1	1.7
non-linear pits	2	7.7	5	15.6	0	0.0	7	11.7
hypocalcified	1	3.8	0	0.0	0	0.0	1	1.7

Table B.8 (cont'd). Hypoplasia Prevalence in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
I2	25		24		1		50	
absent	17	68.0	19	79.2	1	100.0	37	74.0
horizontal line	5	20.0	3	12.5	0	0.0	8	16.0
vertical groove	1	4.0	0	0.0	0	0.0	1	2.0
non-linear pits	0	0.0	2	8.3	0	0.0	2	4.0
hypocalcified	2	8.0	0	0.0	0	0.0	2	4.0
I1	25		19		1		45	
absent	19	76.0	17	89.5	0	0.0	36	80.0
horizontal line	4	16.0	2	10.5	1	100.0	7	15.6
hypocalcified	2	8.0	0	0.0	0	0.0	2	4.4
TOTAL MAXILLARY	219		215		11		445	
absent	183	83.6	193	89.8	8	72.7	384	86.3
horizontal line	19	8.7	13	6.1	3	27.3	35	7.9
vertical groove	4	1.8	0	0.0	0	0.0	4	0.9
non-linear pits	2	0.9	9	4.2	0	0.0	11	2.5
hypocalcified	11	5.0	0	0.0	0	0.0	11	2.5
MANDIBULAR								
M3	25		22		1		48	
absent	24	96.0	21	95.5	1	100.0	46	95.8
non-linear pits	1	4.0	1	4.5	0	0.0	2	4.2
M2	35		33		2		70	
absent	34	97.1	29	87.9	2	100.0	65	92.9
horizontal line	0	0.0	3	9.1	0	0.0	3	4.3
non-linear pits	0	0.0	1	3.0	0	0.0	1	1.4
hypocalcified	1	2.9	0	0.0	0	0.0	1	1.4

Table B.8 (cont'd). Hypoplasia Prevalence in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
M1	34		32		2		68	
absent	32	94.1	31	96.9	2	100.0	65	95.6
non-linear pits	0	0.0	1	3.1	0	0.0	1	1.5
hypocalcified	2	5.9	0	0.0	0	0.0	2	2.9
P4	40		34		2		76	
absent	38	95.0	31	91.2	2	100.0	71	93.4
horizontal pits	0	0.0	1	2.9	0	0.0	1	1.3
non-linear pits	0	0.0	2	5.9	0	0.0	2	2.6
hypocalcified	2	5.0	0	0.0	0	0.0	2	2.6
P3	38		32		2		72	
absent	35	92.1	28	87.5	2	100.0	65	90.3
vertical groove	1	2.6	0	0.0	0	0.0	1	1.4
horizontal pits	0	0.0	1	3.1	0	0.0	1	1.4
non-linear pits	0	0.0	3	9.4	0	0.0	3	4.2
hypocalcified	2	5.3	0	0.0	0	0.0	2	2.8
C	37		33		2		72	
absent	24	64.9	20	60.6	2	100.0	46	63.9
horizontal line	7	18.9	8	24.2	0	0.0	15	20.8
horizontal pits	2	5.4	0	0.0	0	0.0	2	2.8
non-linear pits	2	5.4	4	12.1	0	0.0	6	8.3
hypocalcified	2	5.4	1	3.0	0	0.0	3	4.2
I1	25		26		2		53	
absent	23	92.0	24	92.3	2	100.0	49	92.5
horizontal line	2	8.0	2	7.7	0	0.0	4	7.5
I1	17		24		2		43	
absent	15	88.2	22	91.7	2	100.0	39	90.7
horizontal line	1	5.9	2	8.3	0	0.0	3	7.0
single pit	1	5.9	0	0.0	0	0.0	1	2.3

Table B.8 (cont'd). Hypoplasia Prevalence in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
TOTAL MAND.	251		236		15		502	
absent	225	89.6	206	87.3	15	100.0	446	88.8
horizontal line	10	4.0	15	6.4	0	0.0	25	5.0
vertical groove	1	0.4	0	0.0	0	0.0	1	0.2
horizontal pits	2	0.8	2	0.9	0	0.0	4	0.8
non-linear pits	3	1.2	12	5.1	0	0.0	15	3.0
single pit	1	0.4	0	0.0	0	0.0	1	0.2
hypocalcified	9	3.4	1	0.4	0	0.0	10	2.0
COMBINED JAWS								
Molars	174		159		8		341	
absent	167	96.0	150	94.3	8	100.0	325	95.3
horizontal line	2	1.2	6	3.8	0	0.0	8	2.3
nonlinear pits	1	0.6	3	1.9	0	0.0	4	1.2
hypocalcified	4	2.3	0	0.0	0	0.0	4	1.2
Premolars	141		134		8		283	
absent	125	88.7	122	91.0	8	100.0	255	90.1
horizontal line	4	2.8	3	2.2	0	0.0	7	2.5
vertical groove	3	2.1	0	0.0	0	0.0	3	1.1
horizontal pits	0	0.0	2	1.5	0	0.0	2	0.7
non-linear pits	0	0.0	7	5.2	0	0.0	7	2.5
hypocalcified	9	6.4	0	0.0	0	0.0	9	3.2
Canines	63		65		4		132	
absent	42	66.7	45	69.2	2	50.0	89	67.4
horizontal line	11	17.5	10	15.4	2	50.0	23	17.4
vertical groove	1	1.6	0	0.0	0	0.0	1	0.8
horizontal pits	2	3.2	0	0.0	0	0.0	2	1.5
non-linear pits	4	6.4	9	13.8	0	0.0	13	9.8
hypocalcified	3	4.8	1	1.5	0	0.0	4	3.0

Table B.8 (cont'd). Hypoplasia Prevalence in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
Incisors	92		93		6		191	
absent	74	80.4	82	88.2	5	83.3	161	84.3
horizontal line	12	13.0	9	9.7	1	16.7	22	11.5
vertical groove	1	1.1	0	0.0	0	0.0	1	0.5
non-linear pits	0	0.0	2	2.2	0	0.0	2	1.0
single pits	1	1.1	0	0.0	0	0.0	1	0.5
hypocalcified	4	4.3	0	0.0	0	0.0	4	2.1
OVERALL	470		451		26		947	
absent	408	86.8	399	88.5	23	88.5	830	87.7
horizontal line	29	6.2	28	6.2	3	11.5	60	6.3
vertical groove	5	1.1	0	0.0	0	0.0	5	0.5
pits (all kinds)	8	1.7	23	5.1	0	0.0	31	3.3
hypocalcified	0	4.3	1	0.2	0	0.0	21	2.2

Note: Sides Combined, A=affected, O=observed. 64 Individuals are represented: 31 males, 32 females, 1 ?sex; 59 adults, 5 adolescents.

Table B.9. Dental Enamel Hypoplasia Measurements* in Ban Chiang Permanent Teeth

Burial	Sex	Age	Group*	Tooth†	Distance	Age‡	Tooth	Distance	Age
BC 7	M	35-50	MP VI	LLP3	3.71	3.496	LLP3	5.54	2.334
				LLC	2.82	4.841	LLC	3.64	4.359
BC 10	?	11-13	MP VI	URP3	1.35	5.275			
				LLC	2.23	5.188	LLC	5.53	3.247
				LRC	4.97	3.576	LRC	2.33	5.129
				LRP3	0.46	5.558			
BC 16	F	20-30	EPV/VI	URP3	3.83	4.035	ULP3	4.01	3.945
				LLM2	3.91	4.740	LLM2	1.67	6.006
				LRM2	3.19	5.147	LRM2	1.52	6.091
BC 17	F	old	MP VI	**LLP4**	**3.95**	**4.343**	**LLP3**	**3.26**	**3.781**
BC 20	M	35-40	MP VI	URM2	2.99	5.631	URP3	2.09	4.905
				URI1	3.95	2.814	ULI1	3.95	2.814
				ULP4	3.58	4.354	ULM1	4.26	1.637
				ULM2	**3.58**	**5.263**	LLP4	1.44	5.936
				LLP3	2.74	4.111	LLC	1.46	5.641
				LRC	4.28	3.982	LRP3	5.25	2.518
BC 22	M	18-20	MP VII	ULC	3.58	3.818	ULP3	4.45	3.725
BC 23	M	45-50	EP V	LLC	3.42	4.488	LRC	3.58	4.394
BC 25	M	12-15	EP I-II	**URC**	**9.08**	**0.467**			
				URI1	3.13	3.175	URI1	4.19	2.709
				URI1	5.51	2.129	URI1	7.57	1.224
				ULI1	3.54	2.995	ULI1	4.22	2.696
				ULI1	5.07	2.322	ULI1	8.17	0.960
BC 33	F	45-50	EP II	URI2	3.71	3.129	URI2	4.57	2.788
				URI2	5.38	2.467			
				LLP3	**4.69**	**2.874**	**LLP3**	**3.58**	**3.578**
				LRC	**2.78**	**4.865**	**LRC**	**2.17**	**5.224**

Table B.9 (cont'd). Dental Enamel Hypoplasia Measurements* in Ban Chiang Permanent Teeth

Burial	Sex	Age	Group♦	Tooth†	Distance	Age‡	Tooth	Distance	Age
BC 34	F	40-45	EP II	URM1	2.74	2.326	URP4	2.21	5.007
				URP4	4.16	4.078	URP3	1.18	5.360
				URC	2.69	4.361	URI2	3.61	3.168
				ULC	2.56	4.440	ULP3	2.32	4.790
				ULP4	1.29	5.446	ULM1	2.23	2.558
				LLM1	2.02	2.635	LRI2	2.44	2.871
				LRC	2.22	5.194	LRP3	0.94	5.253
				LRP4	2.39	5.333	LRM1	1.74	2.764
BC 43	M	35-40	EP II	LLC	3.78	4.276	LRC	3.78	4.276
BCES 2	M	35-40	LP X	ULC	4.54	3.233			
BCES 7	M	45-55	LP X	URI2	2.57	3.581			
BCES 11	F	35-50	MP VII	LLI2	2.08	3.023	LLI1	1.18	3.351
				LRI1	1.18	3.351	LRI2	2.19	2.976
				LRC	4.87	3.635			
BCES 19	F	30-35	MP VII	**LLC**	**2.35**	**5.118**	**LLC**	**3.86**	**4.229**
BCES 20	F	35-40	MP VII	ULM2	2.07	6.206	ULM2	1.10	6.328
				LLM2	3.28	5.096			
BCES 21	F	6-8	MP VI	URM1	1.99	2.667			
				LLM1	3.94	1.757	LLM1	4.97	1.285
BCES 29	F	18-20	EP V	ULI1	4.93	2.384	ULI1	2.54	3.484
				ULI2	4.74	2.720	ULI2	2.90	3.450
BCES 33	F	25-30	EP V	LLC	2.83	4.835	LRI2	3.43	2.453
				LRC	2.57	4.988	LRC	4.81	3.671
				LRC	3.51	4.435	LRP3	3.64	3.540
BCES 34	F	25-30	EP IV	URC	1.94	4.818	ULC	1.94	4.818
				LLC	3.94	4.182	LRC	3.55	4.412
BCES 58	?	15-20	EP I-III	URC	7.38	1.503	URC	4.33	3.361
				URI1	4.61	2.524	URI1	3.06	3.205
				ULC	7.31	1.545			

* Distance of defect from cemento-enamel junction (to the nearest 0.01 mm). ♦ EP=Early Period, MP=Middle Period, LP=Late Period. † U=upper, L=lower; R=right, L=left; I=incisor, C=canine, P=premolar, M=molar. ‡ Murray and Murray 1985. **Bold** indicates pitting defects.

Table B.10. Cranial Vault Thickness (mm) in the Adult Skulls from Ban Chiang, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
FEMALES													
BC 4	17-20											C H	
BC 8	35-40	7	7	7	5	3		7		4	6	0	
BC 11	17-23			6							5	F H	
BC 16	20-30		4						4			0	
BC 17	MA-OLD			8	6		7				7	C H	
BC 19	YA				5	5	7					H	
BC 27	25-30					8					8		1/33
BC 3	45-50				6	8					8	C H	1/34
BC 34	40-45	7		5	6	5	10		6		8		R-L-
BC 41	35-40	6	6	5	5	4	6	6				0	R-
BC 45	18-22	5					8	7				0	
BCES 1	18-22	5	4	6	5	6	6	4	5	6	6		R+L+
BCES 9	35-40			8	7	8	10	9	7		7	0	
BCES 11	MA	5		6	6	6	7	8	7				R+
BCES 15A	40-45	6		6	5	8	3		7	7	6	0	
BCES 17	YA		5		6	5	7	7	5	4	5	F H	
BCES 19	30-35											0	R-L-
BCES 20	35-40	9	9	8	8		10	11	8	8	5	0	
BCES 28	35-40		6	7	7	7	7	7			6	0	L-

Table B.10 (cont'd). Cranial Vault Thickness (mm) in the Adult Skulls from Ban Chiang, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
BCES 29	18-20		7		5	4	7	8	5	4	7	C H	L+
BCES 33	25-30	7	7	9	9	9	6	6		5	12	C A	
BCES 34	25-30	8	7		4	8	9	9	6		9		R-
BCES 46*	45-50	8	8	8	11		10	10	6	6	8	0	L-
BCES 59	45-50	7	8	9	7	9	7	8		7	11		
BCES 61	MA												L+
MALES													
BC 9	MA					7	6		5		6	0	
BC 12	MA							7		7			
BC 20	35-40	7	7	6	8	9	5	5	9		10	0	L+
BC 23	45-50		6	10	9	9	5	5		11	8	C H	R-L-
BC 35	40-50					7	5		5		7		
BC 43	35-40	6	5	8	9	13	6	6	6				
BC 47	25-30					8	5						L-
BC 54	30-40	5		4	4	7	4				6	C H	
BCES 2	34-40	7	7	7			9		10			0	
BCES 22	MA	4	5	8	12		4	5	4	5	13		R-L-
BCES 24	30-35	8	7	7	8	6	6		7				
BCES 31	45-50	6	6	7	7	7	6	6	5	5	8		R-L-

Table B.10 (cont'd). Cranial Vault Thickness (mm) in the Adult Skulls from Ban Chiang, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
BCES 35	45-50	5	5	6	7		7	6	7	8	6	0	
BCES 40	45-50	6	6	6	9	7	5		9			0	R-
BCES 45	45-50	6		7	7	10	8	8	7	6	9		R-L-
BCES 47	45-50								6	8	12	0	R-L-
BCES 49	35-40							6		6	6	C H	
BCES 49A	45-50							4†				0	
BCES 50	25-30	7		7	7	6		6	6		11	0	R-L-
BCES 51	40-45	8	8	11	13	9	6	8	9	6	8	C H	L-
BCES 56	45-50	5	5	9	8	8	5		7	7	9	C H	
BCES 65	40-45		6		6	4	6	6	6	8	8		L-
BCES 72	35-40											0	R-L-
BCES 73	35-40		5		6		6	5	5	5	9	0	R+
BCES 76	25-30	6	6	5	8	10	6	7	6	5	7		L-
2386	MA-OLD		7	5			6				7	F H	R-

* Retained metopic suture may account for increased thickness. † Not included in metric analysis. Note: C=coarse (> 0.5 mm), F=fine (< 0.5 mm), H=healed, A=active, R=Right, L=Left, 0=absent, +=present, -=absent.

Table B.11. Cranial Vault Thickness (in mm) in Subadults from Ban Chiang, Thailand

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt.	Lt.	Rt	Lt			
BCES 48	NB											A	
BC 43A	3-6 Mos											0	
BC 46	6-9 Mos	1	1	3		2	2					0	R-L-
BCES 16	6-9 Mos											0	L-
BCES 4	9-12 Mos												R-L-
BCES 12	9-12 Mos											0	L-
BCES 13	12-18 Mos											0	
BCES 14	12-18 Mos		1			3	1	2	1	2	4		
BC 1A	1-2				1	2	1				4	0	
BCES 8	2-3		2	3		2		3		2	2	0	R-
BC 40	2-3		2			2		3			3	0	L+
BC 36	2-4											0	R+L+
BCES 54	3-4	3	2	3	2		2	2				0	R+L+
BCES 67	3-4											0	L-
BCES 70	3-4	3	2	3	3			3		3	3	0	R-L-
BCES 38	3.5-4.5	1	1	3	3	4	2	2		2	4	0	R-L-
BCES 26	3-5		3	3	4	3		3		3	2		L+

Table B.11 (cont'd). Cranial Vault Thickness (in mm) in Subadults from Ban Chiang, Thailand

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt.	Lt.	Rt	Lt			
BCES 5	5-6												R-
BCES 62	5-7	3			3	4		4			4	0	R+L+
BCES 52	6-7	3		5	3	4	5	4		4	4	0	R+L+
BCES 55	14-16	6	6	8	7	6	6	6	6	6	6	0	

* Metopic suture may account for increased thickness. † Not included in metric analysis. Note: C=coarse (> 0.5 mm), F=fine (< 0.5 mm), H=healed, A=active, R=Right, L=Left, 0=absent, +=present, -=absent.

Table B.12. Prevalence of Premortem Tooth Loss in Adult Permanent Teeth from Ban Chiang

Jaw Tooth	Males		Females		Total (♂+♀+?)	
	A/O	%	A/O	%	A/O	%
Maxillary						
M3	2/36	5.6	3/24	12.5	5/60	8.3
M2	3/41	7.3	3/39	7.7	6/81	7.4
M1	5/43	11.6	1/39	2.6	6/84	7.1
P4	2/42	4.8	0/43	0.0	2/87	2.3
P3	3/44	6.8	1/41	2.4	4/87	4.6
C	1/42	2.4	0/40	0.0	1/84	1.2
I2	0/37	0.0	1/36	2.8	1/74	1.4
I1	1/37	2.7	*2/33	6.1	3/71	4.2
M + P	15/206	7.3	8/186	4.3	23/399	5.8
C + I	2/116	1.7	3/109	2.8	5/229	2.2
Total Maxillary	17/322	5.3	11/295	3.7	28/628	4.5
Mandibular						
M3	12/43	27.9	8/32	25.0	20/75	26.7
M2	6/51	11.8	9/46	19.6	15/99	15.2
M1	6/50	12.0	4/46	8.7	10/98	10.2
P4	3/52	5.8	2/45	4.4	5/99	5.1
P3	1/51	2.0	2/46	4.3	3/99	3.0
C	0/52	0.0	2/43	4.7	2/97	2.1
I2	3/48	6.3	1/38	2.6	4/88	4.5
I1	†5/44	11.4	0/36	0.0	5/82	6.1
M + P	28/247	11.3	25/215	11.6	53/470	11.3
C + I	8/144	5.6	3/117	2.6	11/267	4.1
Total Mandibular	36/391	9.2	28/332	8.4	64/737	8.7
Overall	53/713	7.4	39/627	6.2	92/1365	6.7

Note: A=affected, O=observed. Observed teeth includes teeth present, teeth lost pre-mortem and post-mortem, roots, evulsed and impacted; agenetic and unerupted teeth are not included. 65 individuals are included: 31 males, 33 females, 1 ?sex. *Possible ablation in a single individual. †Two teeth possibly evulsed in a single individual.

Table B.13. Frequency of Occurrence of Caries in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		?Sex (N)		Total (N)	
	n	%	n	%	n	%	n	%
MAXILLARY								
M3	29		19		0		48	
absent	22	75.9	16	84.2			38	79.2
occlusal fissure	1	3.4	1	5.3			2	4.2
occlusal gross	0	0.0	2	10.5			2	4.2
interproximal mesial	1	3.4	0	0.0			1	2.1
CEJ buccal	3	10.3	0	0.0			3	6.3
huge caries	2	6.9	0	0.0			2	4.2
M2	35		35		1		71	
absent	31	88.6	30	85.7	1	100.0	62	87.3
occlusal fissure	0	0.0	2	5.7	0	0.0	2	2.8
occlusal gross	0	0.0	2	5.7	0	0.0	2	2.8
interproximal-distal	2	5.7	1	2.9	0	0.0		4.2
CEJ buccal	2	5.7	0	0.0	0	0.0	2	2.8
M1	36		35		2		73	
absent	35	97.2	32	91.4	2	100.0	69	94.5
occlusal fissure	0	0.0	2	5.7	0	0.0	2	2.7
CEJ distal	0	0.0	1	2.9	0	0.0	1	1.4
huge caries	1	2.8	0	0.0	0	0.0	1	1.4
P4	36		42		2		80	
present	0	0.0	0	0.0	0	0.0	0	0.0
P3	37		36		2		75	
absent	36	97.3	36	100.0	2	100.0	74	98.7
interproximal distal	1	2.7	0	0.0	0	0.0	1	1.3

Table B.13 (cont'd). Prevalence of Caries in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		?Sex (N)		Total (N)	
	n	%	n	%	n	%	n	%
C	32		34		2		68	
absent	29	90.6	34	100.0	2	100.0	65	95.6
interproximal mesial	1	3.1	0	0.0	0	0.0	1	1.5
lingual crown	1	3.1	0	0.0	0	0.0	1	1.5
CEJ buccal	1	3.1	0	0.0	0	0.0	1	1.5
I2	33		27		1		61	
absent	31	93.9	27	100.0	1	100.0	59	96.7
interproximal distal	1	3.0	0	0.0	0	0.0	1	1.6
huge caries	1	3.0	0	0.0	0	0.0	1	1.6
I1	31		22		1		54	
absent	31	100.0	21	95.5	1	100.0	53	98.1
crown buccal	0	0.0	1	4.5	0	0.0	1	1.9
TOTAL MAXILLARY	269		250		11		530	
absent	251	93.3	238	95.2	11	100.0	500	94.3
occlusal (all)	1	0.4	9	3.6	0	0.0	10	1.9
crown (all)	1	0.4	1	0.4	0	0.0	2	0.4
CEJ (all)	6	2.2	1	0.4	0	0.0	7	1.3
interproximal (all)	6	2.2	1	0.4	0	0.0	7	1.3
huge	4	1.5	0	0.0	0	0.0	4	0.8
MANDIBULAR								
M3	28		23		1		52	
absent	22	78.6	18	78.3	1	100.0	41	78.9
occlusal fissure	4	14.3	2	8.7	0	0.0	6	11.5
occlusal gross	0	0.0	3	13.0	0	0.0	3	5.8
interproximal mesial	1	3.6	0	0.0	0	0.0	1	1.9
huge caries	1	3.6	0	0.0	0	0.0	1	1.9

Table B.13 (cont'd). Prevalence of Caries in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		?Sex (N)		Total (N)	
	n	%	n	%	n	%	n	%
M2	40		34		2		76	
absent	32	80.0	28	82.4	2	100.0	62	81.6
occlusal fissure	2	5.0	3	8.8	0	0.0	5	6.6
interproximal mesial	4	10.0	0	0.0	0	0.0	4	5.3
interproximal distal	1	2.5	2	5.9	0	0.0	3	3.9
buccal crown	0	0.0	1	2.9	0	0.0	1	1.3
huge caries	1	2.5	0	0.0	0	0.0	1	1.3
M1	40		39		2		81	
absent	33	82.5	36	92.3	2	100.0	71	87.7
occlusal fissure	1	2.5	3	7.7	0	0.0	4	4.9
occlusal gross	2	5.0	0	0.0	0	0.0	2	2.5
interproximal mesial	1	2.5	0	0.0	0	0.0	1	1.2
interproximal distal	3	7.5	0	0.0	0	0.0	3	3.7
P4	44		40		2		86	
absent	43	97.7	39	97.5	2	100.0	84	97.7
interproximal distal	1	2.3	1	2.5	0	0.0	2	2.3
P3	42		37		2		81	
absent	42	100.0	36	97.3	2	100.0	80	98.8
interproximal distal	0	0.0	1	2.7	0	0.0	1	1.2
C	43		35		2		80	
absent	40	93.0	32	91.4	2	100.0	74	92.5
occlusal cusp	0	0.0	2	5.7	0	0.0	2	2.5
occlusal gross	1	2.3	1	2.9	0	0.0	2	2.5
interproximal mesial	1	2.3	0	0.0	0	0.0	1	1.3
huge caries	1	2.3	0	0.0	0	0.0	1	1.3

Table B.13 (cont'd). Prevalence of Caries in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		?Sex (N)		Total (N)	
	n	%	n	%	n	%	n	%
I2	28		29		2		59	
absent	27	96.4	29	100.0	2	100.0	58	100.0
interproximal distal	1	3.7	0	0.0	0	0.0	1	1.7
I1	19		27		2		48	
absent	18	94.7	27	100.0	2	100.0	47	97.9
huge caries	1	5.3	0	0.0	0	0.0	1	2.1
TOTAL MANDIBULAR	284		264		15		563	
absent	257	90.5	245	92.8	15	100.0	517	91.8
occlusal	10	3.5	14	5.3	0	0.0	24	4.3
interproximal	13	4.6	4	1.5	0	0.0	17	3.0
buccal crown	0	0.0	1	0.4	0	0.0	1	0.2
huge	4	1.4	0	0.0	0	0.0	4	0.7
MAX. AND MAND.								
Molars	208		185		8		401	
absent	175	84.1	160	86.5	8	100.0	343	85.5
occlusal fissure	8	3.9	13	7.0	0	0.0	21	5.2
occlusal gross	2	1.0	7	3.8	0	0.0	9	2.2
interproximal mesial	7	3.4	0	0.0	0	0.0	7	1.7
interproximal distal	6	2.9	3	1.6	0	0.0	9	2.2
buccal crown	0	0.0	1	0.5	0	0.0	1	0.2
CEJ distal	0	0.0	1	0.5	0	0.0	1	0.2
CEJ buccal	5	2.4	0	0.0	0	0.0	5	1.2
huge caries	5	2.4	0	0.0	0	0.0	5	1.2
Premolars	159		155		8		322	
absent	157	98.7	153	98.7	8	100.0	318	98.8
interproximal distal	2	1.3	2	1.3	0	0.0	4	1.2

Table B.13 (cont'd). Prevalence of Caries in Ban Chiang Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		?Sex (N)		Total (N)	
	n	%	n	%	n	%	n	%
Canines	75		69		4		148	
absent	69	92.0	66	95.7	4	100.0	139	93.9
occlusal cusp	0	0.0	2	2.9	0	0.0	2	1.4
occlusal gross	1	1.3	1	1.4	0	0.0	2	1.4
interproximal mesial	2	2.6	0	0.0	0	0.0	2	1.4
lingual crown	1	1.3	0	0.0	0	0.0	1	0.7
CEJ buccal	1	1.3	0	0.0	0	0.0	1	0.7
huge caries	1	1.3	0	0.0	0	0.0	1	0.7
Incisors	111		105		6		222	
absent	107	96.4	104	99.0	6	100.0	217	97.7
interproximal distal	2	1.8	0	0.0	0	0.0	2	0.9
buccal crown	0	0.0	1	1.0	0	0.0	1	0.5
huge caries	2	1.8	0	0.0	0	0.0	2	0.9
OVERALL	553		514		26		1093	
absent	508	91.9	483	94.0	26	100.0	1017	93.0
occlusal (all)	11	2.0	23	4.5	0	0.0	34	3.1
interproximal (all)	19	3.4	5	1.0	0	0.0	24	2.2
crown (all)	1	0.2	2	0.4	0	0.0	3	0.3
CEJ (all)	6	1.1	1	0.2	0	0.0	7	0.6
huge	8	1.5	0	0.0	0	0.0	8	0.7

Note: M=molar, P=premolar, C=canine, I=incisor, CEJ=cemento-enamel junction.
Includes 65 individuals: 31 males, 33 females, 1 ?sex; 60 adults (>20 years) 5 adolescents (15-20 years).

Table B.14. Prevalence of Alveolar Resorption in Adult Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
MAXILLARY								
M3	24		16		0		40	
absent	10	41.7	6	37.5			16	40.0
slight	5	20.8	7	43.8			12	30.0
moderate	7	29.2	3	18.8			10	25.0
marked	2	8.3	0	0.0			2	5.0
M2	26		25		1		52	
absent	10	38.5	14	56.0	0	0.0	24	46.2
slight	6	23.1	7	28.0	1	100.0	14	26.9
moderate	8	30.8	4	16.0	0	0.0	12	23.1
marked	2	7.7	0	0.0	0	0.0	2	3.8
M1	28		26		0		54	
absent	11	39.3	14	53.8			25	46.3
slight	10	35.7	10	38.5			20	37.0
moderate	6	21.4	2	7.7			8	14.8
marked	1	3.6	0	0.0			1	1.9
P4	32		35		1		68	
absent	8	25.0	21	60.0	1	100.0	30	44.1
slight	17	53.1	11	31.4	0	0.0	28	41.2
moderate	6	18.8	3	8.6	0	0.0	9	13.2
marked	1	3.1	0	0.0	0	0.0	1	1.5
P3	31		30		0		61	
absent	11	35.5	22	73.3			33	54.1
slight	12	38.7	6	20.0			18	29.5
moderate	7	22.6	2	6.7			9	14.8
marked	1	3.2	0	0.0			1	1.6

Table B.14 (cont'd). Prevalence of Alveolar Resorption in Adult Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
C	27		27		0		54	
absent	13	48.2	24	88.9			37	68.5
slight	11	40.7	0	0.0			11	20.4
moderate	2	7.4	3	11.1			5	9.3
marked	1	3.7	0	0.0			1	1.9
I2	27		26		0		53	
absent	14	51.9	24	92.3			38	71.7
slight	11	40.7	0	0.0			11	20.8
moderate	1	3.7	2	7.7			3	5.7
marked	1	3.7	0	0.0			1	1.9
I1	25		23		0		48	
absent	14	56.0	20	87.0			34	70.8
slight	10	40.0	0	0.0			10	20.8
moderate	0	0.0	3	13.0			3	6.3
marked	1	4.0	0	0.0			1	2.1
TOTAL MAXILLARY	220		208		2		430	
absent	91	41.4	145	69.7	1	50.0	237	55.1
slight	82	37.3	41	19.7	1	50.0	124	28.8
moderate	37	16.8	22	10.6	0	0.0	59	13.7
marked	10	4.5	0	0.0	0	0.0	10	2.3
MANDIBULAR								
M3	24		19		0		43	
absent	12	50.0	9	47.4			21	48.8
slight	8	33.3	5	26.3			13	30.2
moderate	4	16.7	5	26.3			9	20.9

Table B.14 (cont'd). Prevalence of Alveolar Resorption in Adult Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
M2	34		32		1		67	
absent	21	61.8	19	59.4	1	100.0	41	61.2
slight	6	17.6	11	34.4	0	0.0	17	25.4
moderate	5	14.7	2	6.3	0	0.0	7	10.4
marked	2	5.9	0	0.0	0	0.0	2	3.0
M1	37		34		0		71	
absent	19	51.4	21	61.8			40	56.3
slight	11	29.7	9	26.5			20	28.2
moderate	6	16.2	4	11.8			10	14.1
marked	1	2.7	0	0.0			1	1.4
P4	41		36		0		77	
absent	22	53.7	23	63.9			45	58.4
slight	14	34.1	11	30.6			25	32.5
moderate	3	7.3	2	5.6			5	6.5
marked	2	4.9	0	0.0			2	2.6
P3	41		30		0		71	
absent	27	65.9	23	76.7			50	70.4
slight	11	26.8	6	20.0			17	23.9
moderate	1	2.4	1	3.3			2	2.8
marked	2	4.9	0	0.0			2	2.8
C	31		25		1		57	
absent	15	48.4	23	92.0	1	100.0	39	68.4
slight	13	41.9	2	8.0	0	0.0	15	26.3
moderate	1	3.2	0	0.0	0	0.0	1	1.8
marked	2	6.5	0	0.0	0	0.0	2	3.5
I2	29		22		2		53	
absent	16	55.2	20	90.9	2	100.0	38	71.7
slight	11	37.9	2	9.1	0	0.0	13	24.5
moderate	2	6.9	0	0.0	0	0.0	2	3.8

Table B.14 (cont'd). Prevalence of Alveolar Resorption in Adult Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
I1	21		20		2		43	
absent	10	47.6	18	90.0	2	100.0	30	69.8
slight	9	42.9	2	10.0	0	0.0	11	25.6
marked	2	9.5	0	0.0	0	0.0	2	4.7
TOTAL MAND.	258		218		6		482	
absent	142	55.0	156	71.6	6	100.0	304	63.1
slight	83	32.2	48	22.0	0	0.0	131	27.2
moderate	22	8.5	14	6.4	0	0.0	36	7.5
marked	11	4.3	0	0.0	0	0.0	11	2.3
COMBINED JAWS								
Molars	173		152		2		327	
absent	83	48.0	83	54.6	1	50.0	167	51.1
slight	46	26.6	49	32.2	1	50.0	96	29.4
moderate	36	20.8	20	13.2	0	0.0	56	17.1
marked	8	4.6	0	0.0	0	0.0	8	2.4
Premolars	145		131		1		277	
absent	68	46.9	89	67.9	1	100.0	158	57.0
slight	54	37.2	34	26.0	0	0.0	88	31.8
moderate	17	11.7	8	6.1	0	0.0	25	9.0
marked	6	4.1	0	0.0	0	0.0	6	2.2
Canines	58		52		1		111	
absent	28	48.3	47	90.4	1	100.0	76	68.5
slight	24	41.4	2	3.8	0	0.0	26	23.4
moderate	3	5.2	3	5.8	0	0.0	6	5.4
marked	3	5.2	0	0.0	0	0.0	3	2.7

Table B.14 (cont'd). Prevalence of Alveolar Resorption in Adult Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
Incisors	102		91		4		197	
absent	54	52.9	82	90.1	4	100.0	140	71.1
slight	41	40.2	4	4.4	0	0.0	45	22.8
moderate	3	2.9	5	5.5	0	0.0	8	4.1
marked	4	3.9	0	0.0	0	0.0	4	2.0
OVERALL	478		426		8		912	
absent	233	48.7	301	70.7	7	87.5	541	59.3
slight	165	34.5	89	20.9	1	12.5	255	28.0
moderate	59	12.3	36	8.5	0	0.0	95	10.4
marked	21	4.4	0	0.0	0	0.0	21	2.3

Note: 57 individuals represented: 27 males, 29 females, 1 ?sex; 53 adults, 4 adolescents.

Table B.15. Prevalence of Calculus in Adult Permanent Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
MAXILLARY								
M3	26		14		0		40	
absent	3	11.5	2	14.3			5	12.5
slight	11	42.3	5	35.7			16	40.0
moderate	12	46.2	7	50.0			19	47.5
M2	33		32		1		66	
absent	0	0.0	2	6.3	0	0.0	2	3.0
slight	16	48.5	15	46.9	1	100.0	32	48.5
moderate	17	51.5	15	46.9	0	0.0	32	48.5
M1	35		32		2		69	
absent	0	0.0	2	6.3	0	0.0	2	2.9
slight	18	51.4	15	46.9	2	100.0	35	50.7
moderate	17	48.6	15	46.9	0	0.0	32	46.4
P4	32		37		2		71	
absent	2	6.3	5	13.5	0	0.0	7	9.9
slight	24	75.0	25	67.6	2	100.0	51	71.8
moderate	6	18.8	7	18.9	0	0.0	13	18.3
P3	29		30		2		61	
absent	0	0.0	4	13.3	0	0.0	4	6.6
slight	22	75.9	19	63.3	2	100.0	43	70.5
moderate	7	24.1	7	23.3	0	0.0	14	23.0
C	25		29		2		56	
absent	0	0.0	3	10.3	0	0.0	3	5.4
slight	21	84.0	22	75.9	2	100.0	45	80.4
moderate	4	16.0	4	13.8	0	0.0	8	14.3
I2	25		22		1		48	
absent	1	4.0	3	13.6	0	0.0	4	8.3
slight	20	80.0	17	77.3	1	100.0	38	79.2
moderate	4	16.0	2	9.1	0	0.0	6	12.5

Table B.15 (cont'd). Prevalence of Calculus in Adult Permanent Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
I1	25		17		0		42	
absent	1	4.0	3	17.6			4	9.5
slight	20	80.0	12	70.6			32	76.2
moderate	4	16.0	2	11.8			6	14.3
TOTAL MAXILLARY	230		213		10		453	
absent	7	3.0	24	11.3	0	0.0	31	6.8
slight	152	66.1	130	61.0	10	100.0	292	64.5
moderate	71	30.9	59	27.7	0	0.0	130	28.7
MANDIBULAR								
M3	26		19		0		45	
absent	0	0.0	4	21.1			4	8.9
slight	18	69.2	11	57.9			29	64.4
moderate	8	30.8	4	21.1			12	26.7
M2	35		32		1		68	
absent	0	0.0	5	15.6	1	100.0	6	8.8
slight	26	74.3	18	56.3	0	0.0	44	64.7
moderate	9	25.7	9	28.1	0	0.0	18	26.5
M1	38		35		2		75	
absent	1	2.6	4	11.4	0	0.0	5	6.7
slight	28	73.7	21	60.0	2	100.0	51	68.0
moderate	9	23.7	10	28.6	0	0.0	19	25.3
P4	41		35		2		78	
absent	0	0.0	4	11.4	0	0.0	4	5.1
slight	28	68.3	25	71.4	2	100.0	55	70.5
moderate	13	31.7	6	17.1	0	0.0	19	24.4
P3	38		30		2		70	
absent	0	0.0	5	16.7	0	0.0	5	7.1
slight	30	78.9	21	70.0	2	100.0	53	75.7
moderate	8	21.1	4	13.3	0	0.0	12	17.1

Table B.15 (cont'd). Prevalence of Calculus in Adult Permanent Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
C	38		29		2		69	
absent	0	0.0	3	10.3	0	0.0	3	4.3
slight	26	68.4	22	75.9	2	100.0	50	72.5
moderate	12	31.6	4	13.8	0	0.0	16	23.2
I2	23		27		2		52	
absent	0	0.0	2	7.4	0	0.0	2	3.8
slight	16	69.6	18	66.7	2	100.0	36	69.2
moderate	7	30.4	7	25.9	0	0.0	14	26.9
I1	16		21		2		39	
absent	0	0.0	2	9.5	0	0.0	2	5.1
slight	11	68.8	11	52.4	2	100.0	24	61.5
moderate	5	31.3	8	38.1	0	0.0	13	33.3
TOTAL MAND.	255		228		13		496	
absent	1	0.4	29	12.7	1	7.7	31	6.2
slight	183	71.8	147	64.5	12	92.3	342	69.0
moderate	71	27.8	52	22.8	0	0.0	123	24.8
COMBINED JAWS								
Molars	193		164		6		363	
absent	4	2.1	19	11.6	1	16.7	24	6.6
slight	117	60.6	85	51.8	5	83.3	207	57.0
moderate	72	37.3	60	36.6	0	0.0	132	36.4
Premolars	140		132		8		280	
absent	2	1.4	18	13.6	0	0.0	20	7.1
slight	104	74.3	90	68.2	8	100.0	202	72.1
moderate	34	24.3	24	18.2	0	0.0	58	20.7
Canines	63		58		4		125	
absent	0	0.0	6	10.3	0	0.0	6	4.8
slight	47	74.6	44	75.9	4	100.0	95	76.0
moderate	16	25.4	8	13.8	0	0.0	24	19.2

Table B.15 (cont'd). Prevalence of Calculus in Adult Permanent Dentitions from Ban Chiang

Sockets Observed Affected	Male		Female		?Sex		Total	
	A	%	A	%	A	%	A	%
Incisors	89		87		5		181	
absent	2	2.2	10	11.5	0	0.0	12	6.6
slight	67	75.3	58	66.7	5	100.0	130	71.8
moderate	20	22.5	19	21.8	0	0.0	39	21.5
OVERALL	485		441		23		949	
absent	8	1.6	53	12.0	1	4.3	62	6.5
slight	335	69.1	277	62.8	22	95.7	634	66.8
moderate	142	29.3	111	25.2	0	0.0	253	26.7

Note: 63 individuals represented: 30 males, 32 females, 1 ?sex; 58 adults, 5 adolescents.

Table B.16. Prevalence of Dental Attrition in Adult Teeth from Ban Chiang

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
Maxilla								
M3	27		17		0		44	
none	5	18.5	0	0.0			5	11.4
enamel	18	66.7	15	88.2			33	75.0
dentin	4	14.8	2	11.8			6	13.6
M2	34		35		1		70	
none	1	2.9	2	5.7	0	0.0	3	4.3
enamel	18	52.9	25	71.4	1	100.0	44	62.9
dentin	14	41.2	7	20.0	0	0.0	21	30.0
pulp	1	2.9	1	2.9	0	0.0	2	2.9
M1	36		35		2		73	
enamel	6	16.7	16	45.7	2	100.0	24	32.9
dentin	22	61.1	15	42.9	0	0.0	37	50.7
pulp	8	22.2	4	11.4	0	0.0	12	16.4
P4	36		42		2		80	
enamel	13	36.1	25	59.5	2	100.0	40	50.0
dentin	16	44.4	17	40.5	0	0.0	33	41.3
pulp	6	16.7	0	0.0	0	0.0	6	7.5
roots	1	2.8	0	0.0	0	0.0	1	1.3
P3	38		37		2		77	
enamel	12	31.6	20	54.1	2	100.0	34	44.2
dentin	15	39.5	11	29.7	0	0.0	26	33.8
pulp	10	26.3	6	16.2	0	0.0	16	20.8
roots	1	2.6	0	0.0	0	0.0	1	1.3
C	33		35		2		70	
enamel	4	12.1	18	51.4	2	100.0	24	34.3
dentin	17	51.5	12	34.3	0	0.0	29	41.4
pulp	12	36.4	5	14.3	0	0.0	17	24.3

Table B.16 (cont'd). Prevalence of Dental Attrition in Ban Chiang Adult Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
I2	31		27		1		59	
enamel	3	9.7	12	44.4	1	100.0	16	27.1
dentin	20	64.5	12	44.4	0	0.0	32	54.2
pulp	8	25.8	2	7.4	0	0.0	10	16.9
roots	0	0.0	1	3.7	0	0.0	1	1.7
I1	31		22		1		54	
enamel	0	0.0	5	22.7	1	100.0	6	11.1
dentin	15	48.4	15	68.2	0	0.0	30	55.6
pulp	16	51.6	2	9.1	0	0.0	18	33.3
Total Maxillary	266		250		11		527	
none	6	2.3	2	0.8	0	0.0	8	1.5
enamel	74	27.8	136	54.4	11	100.0	221	41.9
dentin	123	46.2	91	36.4	0	0.0	214	40.6
pulp	61	22.9	20	8.0	0	0.0	81	15.4
roots	2	0.8	1	0.5	0	0.0	3	0.6
Mandibular								
M3	29		21		0		50	
none	1	3.4	4	19.0			5	10.0
enamel	16	55.2	14	66.7			30	60.0
dentin	11	37.9	3	14.3			14	28.0
pulp	1	3.4	0	0.0			1	2.0
M2	39		34		2		75	
enamel	12	30.8	24	70.6	2	100.0	38	50.7
dentin	24	61.5	9	26.5	0	0.0	33	44.0
pulp	3	7.7	1	2.9	0	0.0	4	5.3

Table B.16 (cont'd). Prevalence of Dental Attrition in Ban Chiang Adult Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
M1	42		41		2		85	
enamel	5	11.9	11	26.8	2	100.0	18	21.2
dentin	21	50.0	23	56.1	0	0.0	44	51.8
pulp	15	35.7	6	14.6	0	0.0	21	24.7
roots	1	2.4	1	2.4	0	0.0	2	2.4
P4	46		38		2		86	
enamel	16	34.8	23	60.5	2	100.0	41	47.7
dentin	22	47.8	10	26.3	0	0.0	32	37.2
pulp	8	17.4	5	13.2	0	0.0	13	15.1
P3	45		36		2		83	
enamel	17	37.8	22	61.1	2	100.0	41	49.4
dentin	20	44.4	7	19.4	0	0.0	27	32.5
pulp	6	13.3	6	16.7	0	0.0	12	14.5
roots	2	4.4	1	2.8	0	0.0	3	3.6
C	45		35		2		82	
enamel	12	26.7	21	60.0	2	100.0	35	42.7
dentin	22	48.9	10	28.6	0	0.0	32	39.0
pulp	10	22.2	2	5.7	0	0.0	12	14.6
roots	1	2.2	2	5.7	0	0.0	3	3.7
I2	29		30		2		61	
enamel	4	13.8	10	33.3	2	100.0	16	26.2
dentin	19	65.5	16	53.3	0	0.0	35	57.4
pulp	5	17.2	3	10.0	0	0.0	8	13.1
roots	1	3.4	1	3.3	0	0.0	2	3.3
I1	17		27		2		46	
enamel	2	11.8	10	37.0	2	100.0	14	30.4
dentin	13	76.5	15	55.6	0	0.0	28	60.9
pulp	2	11.8	2	7.4	0	0.0	4	8.7

Table B.16 (cont'd). Prevalence of Dental Attrition in Ban Chiang Adult Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
Total Mandibular	292		262		14		568	
none	1	0.3	4	1.5	0	0.0	5	0.9
enamel	84	28.8	135	51.5	14	100.0	233	41.0
dentin	152	52.1	93	35.5	0	0.0	245	43.1
pulp	50	17.1	25	9.5	0	0.0	75	13.2
roots	5	1.7	5	1.9	0	0.0	10	1.8
Combined Jaws								
Molars	207		183		7		397	
none	7	3.4	6	3.3	0	0.0	13	3.3
enamel	75	36.2	105	57.4	7	100.0	187	47.1
dentin	96	46.4	59	32.2	0	0.0	155	39.0
pulp	28	13.5	12	6.6	0	0.0	40	10.1
roots	1	0.5	1	0.5	0	0.0	2	0.5
Premolars	165		153		8		326	
enamel	58	35.2	90	58.8	8	100.0	156	47.9
dentin	73	44.2	45	29.4	0	0.0	118	36.2
pulp	30	18.2	17	11.1	0	0.0	47	14.4
roots	4	2.4	1	0.7	0	0.0	5	1.5
Canines	78		70		4		152	
enamel	16	20.5	39	55.7	4	100.0	59	38.8
dentin	39	50.0	22	31.4	0	0.0	61	40.1
pulp	22	28.2	7	10.0	0	0.0	29	19.1
roots	1	1.3	2	2.9	0	0.0	3	2.0
Incisors	108		106		6		220	
enamel	9	8.3	37	34.9	6	100.0	52	23.6
dentin	67	62.0	58	54.7	0	0.0	125	56.8
pulp	31	28.7	9	8.5	0	0.0	40	18.2
roots	1	0.9	2	1.9	0	0.0	3	1.4

Table B.16 (cont'd). Prevalence of Dental Attrition in Ban Chiang Adult Teeth

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
OVERALL	558		512		25		1095	
none	7	1.3	6	1.2	0	0.0	13	1.2
enamel	158	28.3	271	52.9	25	100.0	454	41.5
dentin	275	49.3	184	35.9	0	0.0	459	41.9
pulp	111	19.9	45	8.8	0	0.0	153	14.0
roots	7	1.3	6	1.2	0	0.0	13	1.2

Note: Includes 65 individuals: 31 males, 33 females and 1 ?sex.

Table B.17. Appendicular Osteoarthritis in Ban Chiang Adults

Articular Surface Change	Degree	Male				Female				Total			
		Right		Left		Right		Left		Right		Left	
		A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
SHOULDER	none	34/79	43.0	26/68	38.2	38/57	66.7	31/44	70.5	72/136	52.9	57/112	50.9
porosis	1	12/79	15.2	8/68	11.8	6/57	10.5	5/44	11.4	18/136	13.2	13/152	8.6
	2	4/79	5.1	4/68	5.9	0/57	0.0	0/44	0.0	4/136	2.9	4/152	2.6
lipping	1	24/79	30.4	27/68	39.7	10/57	17.5	6/44	13.6	34/136	25.0	33/152	21.7
	2	3/79	3.8	2/68	2.9	2/57	3.5	2/44	4.5	5/136	3.7	4/152	2.6
lipping/porosis	1	0/79	0.0	1/68	1.5	1/57	1.8	0/44	0.0	1/136	0.7	1/152	0.7
	2	2/79	2.5	0/68	0.0	0/57	0.0	0/44	0.0	2/136	1.5	0/152	0.0
ELBOW	none	34/108	31.5	32/85	37.6	37/65	56.9	37/67	55.2	71/173	41.0	69/152	45.4
porosis	1	1/108	0.9	0/85	0.0	0/65	0.0	0/67	0.0	1/173	0.6	0/152	0.0
lipping	1	68/108	63.0	47/85	55.3	27/65	41.5	29/67	43.3	95/173	54.9	76/152	50.0
	2	4/108	3.7	3/85	3.5	0/65	0.0	0/67	0.0	4/173	2.3	3/152	2.0
lipping&porosis	1	1/108	0.9	3/85	3.5	1/65	1.5	1/67	1.5	2/173	1.2	4/152	2.6
WRIST	none	18/58	31.0	20/58	34.5	29/40	72.5	23/34	67.6	47/98	48.0	43/92	46.7
lipping	1	38/58	65.5	38/58	65.5	9/40	22.5	10/34	29.4	47/98	48.0	48/92	52.2
	2	2/58	3.4	0/58	0.0	1/40	2.5	0/34	0.0	3/98	3.1	0/92	0.0
lipping&porosis	1	0/58	0.0	0/58	0.0	1/40	2.5	1/34	2.9	1/98	1.0	1/92	1.1

Table B.17 (cont'd). Appendicular Osteoarthritis in Ban Chiang Adults

Articular Surface Change	Degree	Male				Female				Total			
		Right		Left		Right		Left		Right		Left	
		A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
HAND	none	156/374	41.7	173/350	49.4	197/264	74.6	143/210	68.1	353/638	55.3	316/560	56.4
porosis	1	0/374	0.0	2/350	0.6	0/264	0.0	0/210	0.0	0/638	0.0	2/560	0.4
	3	1/374	0.3	0/350	0.0	0/264	0.0	0/210	0.0	1/638	0.2	0/560	0.0
lipping	1	213/374	57.0	171/350	48.9	67/264	25.4	65/210	31.0	280/638	43.9	236/560	42.1
	2	4/374	1.1	4/350	1.1	0/264	0.0	1/210	0.5	4/638	0.6	5/560	0.9
lipping&porosis	1	0/374	0.0	0/350	0.0	0/264	0.0	0/210	0.0	0/638	0.0	2/560	0.4
	2			0/350	0.0	0/264	0.0	1/210	0.5	0/638	0.0	1/560	0.2
PELVIS	none	13/60	21.7	16/64	25.0	24/54	44.4	24/43	55.8	37/114	32.5	40/107	37.4
porosis	1	1/60	1.7	1/64	1.6	0/54	0.0	0/43	0.0	1/114	0.9	1/107	0.9
lipping	1	37/60	61.7	42/64	65.6	25/54	46.3	17/43	39.5	62/114	54.4	59/107	55.1
	2	3/60	5.0	3/64	4.7	4/54	7.4	1/43	2.3	7/114	6.1	4/107	3.7
	3	3/60	5.0	0/64	0.0	0/54	0.0	0/43	0.0	3/114	2.6	0/107	0.0
lipping&porosis	1	2/60	3.3	0/64	0.0	1/54	1.9	1/43	2.3	3/114	2.6	1/107	0.9
	2	0/60	0.0	1/64	1.6	0/54	0.0	0/43	0.0	0/114	0.0	1/107	0.9
	3	1/60	1.7	1/64	1.6	0/54	0.0	0/43	0.0	1/114	0.9	1/107	0.9

Table B.17 (cont'd). Appendicular Osteoarthritis in Ban Chiang Adults

Articular Surface Change	Degree	Male				Female				Total			
		Right		Left		Right		Left		Right		Left	
		A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
KNEE	none	72/117	61.5	62/120	51.7	65/95	68.4	66/95	69.5	137/212	64.6	128/215	59.5
porosis	1	0/117	0.0	1/120	0.8	0/95	0.0	1/95	1.1	0/212	0.0	2/215	0.9
	2	0/117	0.0	0/120	0.0	0/95	0.0	1/95	1.1	0/212	0.0	1/215	0.5
lipping	1	36/117	30.8	49/120	40.8	30/95	31.6	25/95	26.3	66/212	31.1	74/215	34.4
	2	5/117	4.3	5/120	4.2	0/95	0.0	2/95	2.1	5/212	2.4	7/215	3.3
lipping&porosis	1	3/117	2.6	3/120	2.5	0/95	0.0	0/95	0.0	3/212	1.4	3/215	1.4
	2	1/117	0.9	0/120	0.0	0/95	0.0	0/95	0.0	1/212	0.5	0/215	0.0
ANKLE	none	10/53	18.9	15/53	28.3	23/41	56.1	20/38	52.6	33/94	35.1	35/91	38.5
porosis	1	0/53	0.0	0/53	0.0	0/41	0.0	1/38	2.6	0/94	0.0	1/91	1.1
lipping	1	42/53	79.2	37/53	69.8	18/41	43.9	17/38	44.7	60/94	63.8	54/91	59.3
	2	1/53	1.9	1/53	1.9	0/41	0.0	0/38	0.0	1/94	1.1	1/91	1.1
FOOT	none	118/397	29.7	109/385	28.3	172/297	57.9	162/280	57.9	290/694	41.8	271/665	40.8
porosis	1	0/397	0.0	0/385	0.0	1/297	0.3	2/280	0.7	1/694	0.1	2/665	0.3
	2	0/397	0.0	1/385	0.3	0/297	0.0	0/280	0.0	0/694	0.0	1/665	0.2
lipping	1	263/397	66.2	261/385	67.8	122/297	41.1	111/280	39.6	383/694	55.2	372/665	55.9
	2	13/397	3.3	12/385	3.1	2/297	0.7	5/280	1.8	15/694	2.2	17/665	2.6
	3	2/397	0.5	0/385	0.0	0/297	0.0	0/280	0.0	2/694	0.3	2/665	0.2
lipping&porosis	2	1/397	0..3	1/385	0.3	0/297	0.0	0/280	0.0	0/694	0.0	1/665	0.2
	3	0/397	0.0	1/385	0.3	0/297	0.0	0/280	0.0	1/694	0.1	1/665	0.2

Table B.18 Cervical Vertebral Osteoarthritis in Ban Chiang Adults

Cervical Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
CERVICAL FACETS							
C2-C3	none	8/44	18.2	14/38	36.8	22/82	26.8
lipping	1	35/44	79.5	24/38	63.2	59/82	72.0
lipping&porosis	1	1/44	2.3	0/38	0.0	1/82	1.2
C3 - C4	none	12/44	27.3	20/46	43.5	32/90	35.6
lipping	1	28/44	63.6	26/46	56.5	54/90	60.0
	2	2/44	4.5	0/46	0.0	2/90	2.2
	3	2/44	4.5	0/46	0.0	2/90	2.2
C4 - C5	none	11/45	24.4	16/40	40.0	27/85	31.8
lipping	1	30/45	66.7	24/40	60.0	54/85	63.5
	3	2/45	4.4	0/40	0.0	2/85	2.4
porosis	1	2/45	4.4	0/40	0.0	2/85	2.4
C5-C6	none	20/47	42.6	19/41	46.3	39/88	44.3
lipping	1	23/47	48.9	21/41	51.2	44/88	50.0
	2	3/47	6.4	0/41	0.0	3/88	3.4
porosis	1	1/47	2.1	0/41	0.0	1/88	1.1
lipping&porosis	1	0/47	0.0	1/41	2.4	1/88	1.1
C6 - C7	none	32/57	56.1	22/43	51.2	54/100	54.0
lipping	1	24/57	42.1	19/43	44.2	43/100	43.0
	2	1/57	1.8	2/43	4.7	3/100	3.0
C7 - T1	none	24/66	36.4	26/43	60.5	50/109	45.9
lipping	1	40/66	60.6	17/43	39.5	57/109	52.3
lipping&porosis	3	2/66	3.0	0/43	0.0	2/109	1.8
TOTAL	none	107/303	35.3	117/251	46.6	224/554	40.4
lipping	1	180/303	59.4	131/251	52.2	311/554	56.1
	2	6/303	2.0	2/251	0.8	8/554	1.4
	3	4/303	1.3	0/251	0.0	4/554	0.7
porosis	1	3/303	1.0	0/251	0.0	3/554	0.5
lipping&porosis	1	1/303	0.3	1/251	0.4	2/554	0.4
	3	2/303	0.7	0/251	0.0	2/554	0.4

Table B.18 (cont'd). Cervical Vertebral Osteoarthritis in Ban Chiang Adults

Cervical Vertebral Osteoarthritis	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
CERVICAL BODIES						
C2-C3 none	19/22	86.4	13/19	68.4	32/41	78.0
lipping 1	2/22	9.1	2/19	10.5	4/41	9.8
porosis 1	1/22	4.5	4/19	21.1	5/41	12.2
C3-C4 none	15/25	60.0	17/20	85.0	32/45	71.1
porosis 1	8/25	32.0	3/20	15.0	11/45	24.4
2	1/25	4.0	0/20	0.0	1/45	2.2
lipping&porosis 2	1/25	4.0	0/20	0.0	1/45	2.2
C4- C5 none	15/23	65.2	13/19	68.4	28/42	66.7
porosis 1	7/23	30.4	4/19	21.1	11/42	26.2
2	0/23	0.0	2/19	10.5	2/42	4.8
lipping&porosis 2	1/23	4.3	0/19	0.0	1/42	2.4
C5-C6 none	16/21	76.2	14/18	77.8	30/39	76.9
porosis 1	2/21	9.5	2/18	11.1	4/39	10.3
2	1/21	4.8	2/18	11.1	3/39	7.7
lipping&porosis 1	1/21	4.8	0/18	0.0	1/39	2.6
2	1/21	4.8	0/18	0.0	1/39	2.6
C6-C7 none	18/27	66.7	14/18	77.8	32/45	71.1
lipping 1	3/27	11.1	0/18	0.0	3/45	6.7
porosis 1	6/27	22.2	4/18	22.2	10/45	22.2
C7 - T1 none	20/26	76.9	16/18	88.9	36/44	81.8
porosis 1	6/26	23.1	2/18	11.1	8/44	18.2
TOTAL none	103/144	71.5	87/112	77.7	190/256	74.2
lipping 1	5/144	3.5	2/112	1.8	7/256	2.7
porosis 1	30/144	20.8	19/122	17.0	49/256	19.1
2	2/144	1.4	4/122	3.6	6/256	2.3
lipping&porosis 1	1/144	0.7	0/122	0.0	1/256	0.4
2	3/144	2.1	0/122	0.0	3/256	1.2

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 62 individuals: 33 males, 39 females. Each level includes the bilateral inferior facets of the upper vertebra and the bilateral superior facets of the lower vertebra (i.e. possible 4 observations). Each level in the vertebral body includes the inferior and the superior end-plate (i.e. two observations possible).

Table B.19 Thoracic Vertebral Osteoarthritis in Ban Chiang Adults

Thoracic Vertebral Osteoarthritis	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
THORACIC FACETS						
T1-T2 none	20/69	29.0	24/42	57.1	44/111	39.6
lipping 1	48/69	69.6	17/42	40.5	65/111	58.6
2	1/69	1.4	0/42	0.0	1/111	0.9
lipping&porosis 1	0/69	0.0	1/42	2.4	1/111	0.9
T2 - T3 none	18/58	31.0	17/38	44.7	35/96	36.5
lipping 1	39/58	67.2	19/38	50.0	58/96	60.4
2	1/58	1.7	2/38	5.3	3/96	3.1
T3-T4 none	18/56	32.1	14/38	36.8	32/94	34.0
lipping 1	35/56	62.5	21/38	55.3	56/94	59.6
2	0/56	0.0	2/38	5.3	2/94	2.1
porosis 1	1/56	1.8	1/38	2.6	2/94	2.1
lipping&porosis 1	2/56	3.6	0/38	0.0	2/94	2.1
T4 -T5 none	17/57	29.8	18/38	47.4	35/95	36.8
lipping 1	36/57	63.2	20/38	52.6	56/95	58.9
3	1/57	1.8	0/38	0.0	1/95	1.1
lipping&porosis 1	3/57	5.3	0/38	0.0	3/95	3.2
T5-T6 none	13/53	24.5	28/44	63.6	41/97	42.3
lipping 1	39/53	73.6	15/44	34.1	54/97	55.7
porosis 1	0/53	0.0	1/44	2.3	1/97	1.0
lipping&porosis 1	1/53	1.9	0/44	0.0	1/97	1.0
T6 -T7 none	12/55	21.8	23/41	56.1	35/96	36.5
lipping 1	40/55	72.7	18/41	43.9	58/96	60.4
2	1/55	1.8	0/41	0.0	1/96	1.0
lipping&porosis 2	1/55	1.8	0/41	0.0	1/96	1.0
3	1/55	1.8	0/41	0.0	1/96	1.0
T7 - T8 none	11/60	18.3	28/44	63.6	39/104	37.5
lipping 1	44/60	73.3	16/44	36.4	60/104	57.7
2	4/60	6.7	0/44	0.0	4/104	3.8
lipping&porosis 2	1/60	1.7	0/44	0.0	1/104	1.0

Table B.19 (cont'd). Thoracic Vertebral Osteoarthritis in Ban Chiang Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
T8 - T9	none	12/70	17.1	26/44	59.1	38/114	33.3
lipping	1	49/70	70.0	18/44	40.9	67/114	58.8
	2	4/70	5.7	0/44	0.0	4/114	3.5
	3	1/70	1.4	0/44	0.0	1/114	0.9
porosis	1	2/70	2.9	0/44	0.0	2/114	1.8
	2	1/70	1.4	0/44	0.0	1/114	0.9
lipping&porosis	1	1/70	1.4	0/44	0.0	1/114	0.9
T9 - T10	none	16/72	22.2	23/34	67.6	39/106	36.8
lipping	1	49/72	68.1	11/34	32.4	60/106	56.6
	2	2/72	2.8	0/34	0.0	2/106	1.9
	3	2/72	2.8	0/34	0.0	2/106	1.9
porosis	1	1/72	1.4	0/34	0.0	1/106	0.9
	2	1/72	1.4	0/34	0.0	1/106	0.9
lipping&porosis	1	1/72	1.4	0/34	0.0	1/106	0.9
T10 - T11	none	11/80	13.8	31/44	70.5	42/124	33.9
lipping	1	58/80	72.5	13/44	29.5	71/124	57.3
	2	8/80	10.0	0/44	0.0	8/124	6.5
lipping&porosis	1	2/80	2.5	0/44	0.0	2/124	1.6
	2	1/80	1.3	0/44	0.0	1/124	0.8
T11 - T12	none	10/68	14.7	21/50	42.0	31/118	26.3
lipping	1	52/68	76.5	28/50	56.0	80/118	67.8
	2	3/68	4.4	0/50	0.0	3/118	2.5
porosis	1	0/68	0.0	1/50	2.0	1/118	0.8
	2	2/68	2.9	0/50	0.0	2/118	1.7
lipping&porosis	1	1/68	1.5	0/50	0.0	1/118	0.8

Table B.19 (cont'd). Thoracic Vertebral Osteoarthritis in Ban Chiang Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
TOTAL	none	158/698	22.6	253/457	55.4	411/1155	35.6
lipping	1	489/698	70.1	196/457	42.9	685/1155	59.3
	2	25/698	3.6	4/457	0.9	29/1155	2.5
	3	3/698	0.4	0/457	0.0	3/1155	0.3
porosis	1	4/698	0.6	3/457	0.7	7/1155	0.6
	2	4/698	0.6	0/457	0.0	4/1155	0.3
lipping&porosis	1	11/698	1.6	1/457	0.2	12/1155	1.0
	2	3/698	0.4	0/457	0.0	3/1155	0.3
	3	1/698	0.1	0/457	0.0	1/1155	0.1
THORACIC BODIES							
T1 - T2	none	18/26	69.2	13/16	81.3	31/42	73.8
lipping	1	0/26	0.0	1/16	6.3	1/42	2.4
porosis	1	8/26	30.8	2/16	12.5	10/42	23.8
T2 - T3	none	14/24	58.3	12/14	85.7	26/38	68.4
lipping	1	0/24	0.0	1/14	7.1	1/38	2.6
porosis	1	10/24	41.7	1/14	7.1	11/38	28.9
T3-T4	none	13/22	59.1	14/14	100.0	27/36	75.0
porosis	1	9/22	40.9	0/14	0.0	9/36	25.0
T4- T5	none	13/22	59.1	15/15	100.0	28/37	75.7
porosis	1	9/22	40.9	0/15	0.0	9/37	24.3
T5-T6	none	12/21	57.1	14/14	100.0	26/35	74.3
porosis	1	9/21	42.9	0/14	0.0	9/35	25.7
T6-T7	none	12/23	52.2	16/17	94.1	28/40	70.0
lipping	1	1/23	4.3	0/17	0.0	1/40	2.5
porosis	1	9/23	39.1	1/17	5.9	10/40	25.0
lipping&porosis	1	1/23	4.3	0/17	0.0	1/40	2.5
T7 - T8	none	11/23	47.8	15/17	88.2	26/40	65.0
lipping	1	1/23	4.3	0/17	0.0	1/40	2.5
porosis	1	11/23	47.8	2/17	11.8	13/40	32.5

Table B.19 (cont'd). Thoracic Vertebral Osteoarthritis in Ban Chiang Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
T8 - T9	none	12/25	48.0	14/15	93.3	26/40	65.0
lipping	1	1/25	4.0	0/15	0.0	1/40	2.5
porosis	1	12/25	48.0	1/15	6.7	13/40	32.5
T9 - T10	none	13/26	50.0	10/10	100.0	23/36	63.9
lipping	1	1/26	3.8	0/10	0.0	1/36	2.8
porosis	1	11/26	42.3	0/10	0.0	11/36	30.6
	2	1/26	3.8	0/10	0.0	1/36	2.8
T10 - T11	none	13/25	52.0	13/15	86.7	26/40	65.0
lipping	1	1/25	4.0	0/15	0.0	1/40	2.5
porosis	1	7/25	28.0	2/15	13.3	9/40	22.5
	2	1/25	4.0	0/15	0.0	1/40	2.5
lipping&porosis	1	3/25	12.0	0/15	0.0	3/40	7.5
T11 - T12	none	9/27	33.3	14/21	66.7	23/48	47.9
lipping	1	1/27	3.7	1/21	4.8	2/48	4.2
	3	1/27	3.7	0/21	0.0	1/48	2.1
porosis	1	13/27	48.2	5/21	23.8	18/48	37.5
	2	1/27	3.7	0/21	0.0	1/48	2.1
lipping&porosis	1	1/27	3.7	1/21	4.8	2/48	4.2
	2	1/27	3.7	0/21	0.0	1/48	2.1
T12 - L1	none	12/24	50.0	15/23	65.2	27/47	57.4
lipping	1	1/24	4.2	1/23	4.3	2/47	4.3
	3	1/24	4.2	0/23	0.0	1/47	2.1
porosis	1	9/24	37.5	6/23	26.1	15/47	31.9
lipping&porosis	1	1/24	4.2	1/23	4.3	2/47	4.3

Table B.19 (cont'd). Thoracic Vertebral Osteoarthritis in Ban Chiang Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
TOTAL	none	152/288	52.8	165/191	86.4	317/479	66.2
lipping	1	76/288	2.4	4/191	2.1	11/479	2.3
	3	2/288	0.7	0/191	0.0	2/479	0.4
porosis	1	117/288	40.6	20/191	10.5	137/479	28.6
	2	3/288	1.0	0/191	0.0	3/479	0.6
lipping&porosis	1	6/288	2.1	2/191	1.0	8/479	1.7
	2	1/288	0.3	0/191	0.0	1/479	0.2

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 50 individuals: 28 males, 22 females. Each level includes the bilateral inferior facets of the upper vertebra and the bilateral superior facets of the next lower vertebra (i.e. possible 4 observations). Each level in the vertebral body osteoarthritis includes the inferior end-plate and the superior end-plate (i.e. two observations possible).

Table B.20 Rib Facet Osteoarthritis in Ban Chiang Adults

Rib Number Osteoarthritis		Male		Female		Left	
		A/O	%	A/O	%	A/O	%
RIB ONE	none	37/76	48.7	34/46	73.9	71/122	58.2
lipping	1	27/76	35.5	6/46	13.0	33/122	27.0
	2	1/76	1.3	0/46	0.0	1/122	0.8
porosis	1	7/76	9.2	2/46	4.3	9/122	7.4
	2	2/76	2.6	2/46	4.3	4/122	3.3
lipping/porosis	2	2/76	2.6	2/46	4.3	4/122	3.3
RIB TWO	none	27/65	41.5	20/43	46.5	47/108	43.5
lipping	1	32/65	49.2	23/43	53.5	55/108	50.9
	2	4/65	6.2	0/43	0.0	4/108	3.7
porosis	1	2/65	3.1	0/43	0.0	2/108	1.9
RIB THREE	none	24/58	41.4	22/41	53.7	46/99	46.5
lipping	1	30/58	51.7	18/41	43.9	48/99	48.5
	2	1/58	1.7	0/41	0.0	1/99	1.0
porosis	1	3/58	5.2	0/41	0.0	3/99	3.0
	2	0/58	0.0	1/41	2.4	1/99	1.0
RIB FOUR	none	20/57	35.1	20/42	47.6	40/99	40.4
lipping	1	34/57	59.6	20/42	47.6	54/99	54.5
	2	2/57	3.5	1/42	2.4	3/99	3.0
porosis	1	1/57	1.8	1/42	2.4	2/99	2.0
RIB FIVE	none	17/63	27.0	26/54	48.1	43/117	36.8
lipping	1	38/63	60.3	24/54	44.4	62/117	53.0
	2	4/63	6.3	2/54	3.7	6/117	5.1
porosis	1	4/63	6.3	2/54	3.7	6/117	5.1
RIB SIX	none	27/75	36.0	32/49	65.3	59/124	47.6
lipping	1	45/75	60.0	17/49	34.7	62/124	50.0
	2	2/75	2.7	0/49	0.0	2/124	1.6
porosis	1	1/75	1.3	0/49	0.0	1/124	0.8
RIB SEVEN	none	18/60	30.0	32/51	62.7	50/111	45.0
lipping	1	38/60	63.3	15/51	29.4	53/111	47.7
	2	0/60	0.0	1/51	2.0	1/111	0.9
porosis	1	3/60	5.0	3/51	5.9	6/111	5.4
lipping&porosis	1	1/60	1.7	0/51	0.0	1/111	0.9

Table B.20 (cont'd). Rib Facet Osteoarthritis in Ban Chiang Adults

Rib Number Osteoarthritis		Male		Female		Left	
		A/O	%	A/O	%	A/O	%
RIB EIGHT	none	25/66	37.9	25/37	67.6	50/103	48.5
lipping	1	37/66	56.1	10/37	27.0	47/103	45.6
	2	1/66	1.5	0/37	0.0	1/103	1.0
porosis	1	3/66	4.5	1/37	2.7	4/103	3.9
lipping&porosis	1	0/66	0.0	1/37	2.7	1/103	1.0
RIB NINE	none	18/55	32.7	17/35	48.6	35/90	38.9
lipping	1	25/55	45.5	16/35	45.7	41/90	45.6
	2	2/55	3.6	0/35	0.0	2/90	2.2
	3	1/55	1.8	0/35	0.0	1/90	1.1
porosis	1	7/55	12.7	1/35	2.9	8/90	8.9
	2	1/55	1.8	0/35	0.0	1/90	1.1
lipping&porosis	1	1/55	1.8	1/35	2.9	2/90	2.2
RIB TEN	none	11/51	21.6	20/33	60.6	31/84	36.9
lipping	1	28/51	54.9	7/33	21.2	35/84	41.7
	2	1/51	2.0	1/33	3.0	2/84	2.4
porosis	1	8/51	15.7	2/33	6.1	10/84	11.9
	2	1/51	2.0	0/33	0.0	1/84	1.2
lipping&porosis	1	2/51	3.9	3/33	9.1	5/84	6.0
RIB ELEVEN	none	10/49	20.4	28/35	80.0	38/84	45.2
lipping	1	35/49	71.4	4/35	11.4	39/84	46.4
porosis	1	2/49	4.1	2/35	5.7	4/84	4.8
	2	0/49	0.0	1/35	2.9	1/84	1.2
lipping&porosis	1	2/49	4.1	0/35	0.0	2/84	2.4
RIB TWELVE	none	3/36	8.3	23/34	67.6	26/70	37.1
lipping	1	24/36	66.7	8/34	23.5	32/70	45.7
	2	1/36	2.8	0/34	0.0	1/70	1.4
porosis	1	1/36	2.8	3/34	8.8	4/70	5.7
lipping&porosis	1	7/36	19.4	0/34	0.0	7/70	10.0

Table B.20 (cont'd). Rib Facet Osteoarthritis in Ban Chiang Adults

Rib Number Osteoarthritis		Male		Female		Left	
		A/O	%	A/O	%	A/O	%
TOTAL	none	237/711	33.3	299/500	59.8	536/1211	44.3
lipping	1	393/711	55.3	168/500	33.6	561/1211	46.3
	2	19/711	2.7	5/500	1.0	24/1211	2.0
	3	1/711	0.1	0/500	0.0	1/1211	0.1
porosis	1	42/711	5.9	17/500	3.4	59/1211	4.9
	2	2/711	0.3	2/500	0.4	4/1211	0.3
lipping&porosis	1	15/711	2.1	7/500	1.4	22/1211	1.8
	2	2/711	0.3	2/500	0.4	4/1211	0.3

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 53 individuals: 28 males, 25 females. Each rib includes observations of the right and left rib head, right and left rib tubercle, and right and left thoracic facets, giving six possible sites.

Table B.21. Lumbar Vertebral Osteoarthritis in Ban Chiang Adults

Lumbar Articulations Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
LUMBAR FACETS							
T12-L1	none	3/62	4.8	14/52	26.9	17/114	14.9
lipping	1	48/62	77.4	37/52	71.2	85/114	74.6
	2	7/62	11.3	0/52	0.0	7/114	6.1
porosis	1	1/62	1.6	1/52	1.9	2/114	1.8
lipping&porosis	1	1/62	1.6	0/52	0.0	1/114	0.9
	2	2/62	3.2	0/52	0.0	2/114	1.8
L1 - L2	none	3/67	4.5	17/58	29.3	20/125	16.0
lipping	1	54/67	80.6	40/58	69.0	94/125	75.2
porosis	1	2/67	3.0	0/58	0.0	2/125	1.6
lipping&porosis	1	2/67	3.0	1/58	1.7	3/125	2.4
	2	6/67	9.0	0/58	0.0	6/125	4.8
L2-L3	none	5/69	7.2	12/51	23.5	17/120	14.2
lipping	1	45/69	65.2	38/51	74.5	83/120	69.2
	2	5/69	7.2	0/51	0.0	5/120	4.2
porosis	1	0/69	0.0	1/51	2.0	1/120	0.8
lipping&porosis	1	5/69	7.2	0/51	0.0	5/120	4.2
	2	3/69	4.3	0/51	0.0	3/120	2.5
	3	6/69	8.7	0/51	0.0	6/120	5.0
L3 -L4	none	2/65	3.1	17/53	32.1	19/118	16.1
lipping	1	45/65	69.2	30/53	56.6	75/118	63.6
	2	3/65	4.6	0/53	0.0	3/118	2.5
porosis	1	0/65	0.0	3/53	5.7	3/118	2.5
lipping&porosis	1	3/65	4.6	3/53	5.7	6/118	5.1
	2	4/65	6.2	0/53	0.0	4/118	3.4
	3	8/65	12.3	0/53	0.0	8/118	6.8
L4-L5	none	5/65	7.7	9/46	19.6	14/111	12.6
lipping	1	45/65	69.2	36/46	78.3	81/111	73.0
	2	5/65	7.7	1/46	2.2	6/111	5.4
	3	1/65	1.5	0/46	0.0	1/111	0.9
lipping&porosis	1	1/65	1.5	0/46	0.0	1/111	0.9
	3	8/65	12.3	0/46	0.0	8/111	7.2

Table B.21 (cont'd). Lumbar Vertebral Osteoarthritis in Ban Chiang Adults

Lumbar Articulations Osteoarthritis	Male		Female		Total	
	A/O	%	A/O	%	A/O	%
L5 -S1 none	9/55	16.4	10/33	30.3	19/88	21.6
lipping 1	30/55	54.5	21/33	63.6	51/88	58.0
2	9/55	16.4	1/33	3.0	10/88	11.4
3	2/55	3.6	0/33	0.0	2/88	2.3
porosis 1	0/55	0.0	1/33	3.0	1/88	1.1
lipping&porosis 1	1/55	1.8	0/33	0.0	1/88	1.1
2	4/55	7.3	0/33	0.0	4/88	4.5
TOTAL none	27/383	7.0	79/293	27.0	106/676	15.7
lipping 1	267/383	69.7	202/293	68.9	469/676	69.4
2	29/383	7.6	2/293	0.7	31/676	4.6
3	3/383	0.8	0/293	0.0	3/676	0.4
porosis 1	3/383	0.8	6/293	2.0	9/676	1.3
lipping&porosis 1	13/383	3.4	4/293	1.4	17/676	2.5
2	19/383	5.0	0/293	0.0	19/676	2.8
3	22/383	5.7	0/293	0.0	22/676	3.3
LUMBAR BODIES						
L1 - L2 none	11/21	52.4	15/23	65.2	26/44	59.1
lipping 1	2/21	9.5	0/23	0.0	2/44	4.5
3	1/21	4.8	0/23	0.0	1/44	2.3
porosis 1	6/21	28.6	7/23	30.4	13/44	29.5
2	1/21	4.8	0/23	0.0	1/44	2.3
lipping&porosis 1	0/21	0.0	1/23	4.3	1/44	2.3
L2-L3 none	8/24	33.3	9/19	47.4	17/43	39.5
lipping 1	4/24	16.7	1/19	5.3	5/43	11.6
2	1/24	4.2	0/19	0.0	1/43	2.3
3	2/24	8.3	0/19	0.0	2/43	4.7
porosis 1	4/24	16.7	8/19	42.1	12/43	27.9
lipping&porosis 1	4/24	16.7	1/19	5.3	5/43	11.6
2	1/24	4.2	0/19	0.0	1/43	2.3

Table B.21 (cont'd). Lumbar Vertebral Osteoarthritis in Ban Chiang Adults

Lumbar Articulations Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
L3- L4	none	5/25	20.0	7/19	36.8	12/44	27.3
lipping	1	2/25	8.0	0/19	0.0	2/44	4.5
	2	2/25	8.0	0/19	0.0	2/44	4.5
	3	2/25	8.0	0/19	0.0	2/44	4.5
porosis	1	6/25	24.0	7/19	36.8	13/44	29.5
lipping&porosis	1	5/25	20.0	3/19	15.8	8/44	18.2
	2	3/25	12.0	2/19	10.5	5/44	11.4
L4-L5	none	6/27	22.2	6/18	33.3	12/45	26.7
lipping	1	7/27	25.9	1/18	5.6	8/45	17.8
	2	2/27	7.4	0/18	0.0	2/45	4.4
	3	2/27	7.4	0/18	0.0	2/45	4.4
porosis	1	4/27	14.8	10/18	55.6	14/45	31.1
lipping&porosis	1	4/27	14.8	1/18	5.6	5/45	11.1
	2	2/27	7.4	0/18	0.0	2/45	4.4
L5-S1	none	8/28	28.6	7/15	46.7	15/43	34.9
lipping	1	2/28	7.1	0/15	0.0	2/43	4.7
	2	2/28	7.1	0/15	0.0	2/43	4.7
	3	1/28	3.6	0/15	0.0	1/43	2.3
porosis	1	11/28	39.3	6/15	40.0	17/43	39.5
lipping&porosis	1	3/28	10.7	2/15	13.3	5/43	11.6
	2	1/28	3.6	0/15	0.0	1/43	2.3
TOTAL	none	38/125	30.4	44/94	46.8	82/219	37.4
lipping	1	17/125	13.6	2/94	2.1	19/219	8.7
	2	7/125	5.6	0/94	0.0	7/219	3.2
	3	8/125	6.4	0/94	0.0	8/219	3.7
porosis	1	31/125	24.8	38/94	40.4	69/219	31.5
	2	1/125	0.8	0/94	0.0	1/219	0.5
lipping&porosis	1	16/125	12.8	8/94	8.5	24/219	11.0
	2	7/125	5.6	2/94	2.1	9/219	4.1

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 48 individuals: 28 males, 20 females. Each level includes the bilateral inferior facets of the upper vertebra and the bilateral superior facets of the next lower vertebra (i.e. possible 4 observations). Each level in the vertebral body includes the inferior and superior end-plate (i.e. two observations possible).

Table B.22. Temporal Distribution of the 1966[1] Non Nok Tha Burials (By Burial Number)[2]

Period (Burial #) Subtotals (N)	Secure Context (N=26)			Insecure Context (N=46)				Total (Number of Burials)			
	Male	Female	Subadult[3]	Male	Female	?Sex	Subadult[3]	♂	♀	?Sex	<15
EP 1-2	6						64*	1			1
EP 3	26,81			80*			79	3			1
Total EP (N)	3			1			2	4			2
MP 1-2	8A,67,77	2,8,20,28, 59		25A,88	25B,30,54 62*	68,70*	61,83,84 29	5	9	2	4
MP 3	55	53,63	14	38*,72	24,27		56,74	3	4		3
MP 4	22	4		16,48,50, 65,78,90,	9,15,17,18	19†		7	5		
MP 5	12,34	31	57,58	10	23	71†,73†	7,35,36	3	2		5
MP 7		43	46	45,75	44		44A	2	2		2
MP 8		40,42		51	41,47,49		52	1	5		1
Total MP (N)	7	12	4	14	15	2	11	21	27	2	15
Total (N)	10	12	4	15	15	2	13	25	27	2	17

[1] Adapted from Parker (in press), Bayard 1985.

[2] Includes burial features with skeletal material only. Does not include Burial "C" because of unknown provenience, Burial 32 because no data was collected, and the intrusive Burials 12A, 22A, 30A, 43A, 77A because of uncertain provenience.

[3] Subadults are less than 15 years of age.

† Burials 19, 71 and 73 were not located in 1993.

* Burials 38, 62, 64, 70, and 80 are omitted from all temporal analyses because the identified remains do not agree with the field descriptions, therefore provenience unknown.

Table B.23. Temporal Distribution[1] of the 1968 Non Nok Tha Burials (By Burial Number)[2]

Period (Burial #) Subtotals (N)	Secure Context (N=54)				Insecure Context (N=49)			Total (Number of Burials)			
	Male	Female	?Sex	Subadult[3]	Male	Female	Subadult[3]	♂	♀	?Sex	<15
EP 1	62	4,83 M125*		14,91,94 125		45	8,16,40 72,96	1	4		9
EP 2		78		29,36,46 82,87,112,121	42,89	88	77	2	2		8
EP 3	10,90	52,79		12,81		117		2	3		2
Total EP (N)	3	6		13	2	3	6	5	9		19
MP 1	41,64 71B,110	71A,74 103,111 114,123		34	73,73A 76	20,75,108	116	7	9		2
MP 4	7,32,33 47,85	39,124	18	7A,15	3,9,38,55	30,31,37 86	5,35,80 86A	9	6	1	6
MP 5	23,49	59			95	17,21,22 28,98	51	3	6		1
MP 6	1,26,56,6 1	48,57,58 60			24,27,67 70	11,43,43 A68,69	2,25,70A	8	9		3
Total MP (N)	15	13	1	3	12	17	9	27	30	1	12
Total (N)	18	19	1	16	14	20	15	32	39	1	31

[1] Adapted from Bayard (1971, 1985).
[2] Includes burial features with skeletal material only. Includes multiple burials.
[3] Subadults are less than 15 years of age.
* Not noted in Bayard (1971, 1985).

Table B.24. Traditional Abridged Life Table for Non Nok Tha, Thailand

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-0.9	1	6.67	3.79	100.00	0.0379	98.11	0.0386	3085.49	30.85
1-2.9	2	9.34	5.31	96.21	0.0552	187.11	0.0284	2987.39	31.05
3-4.9	2	12.66	7.19	90.90	0.0791	174.61	0.0412	2800.27	30.81
5-9.9	5	12.33	7.01	83.71	0.0837	401.03	0.0175	2625.66	31.37
10-14.9	5	4	2.27	76.70	0.0296	377.83	0.0060	2224.63	29.00
15-19.9	5	3	1.70	74.43	0.0229	367.89	0.0046	1846.80	24.81
20-24.9	5	11.14	6.33	72.73	0.0870	347.80	0.0182	1478.91	20.34
25-29.9	5	12.14	6.90	66.40	0.1039	314.73	0.0219	1131.10	17.04
30-34.9	5	11.14	6.33	59.50	0.1064	281.66	0.0225	816.37	13.72
35-39.9	5	27.81	15.80	53.17	0.2972	226.33	0.0698	534.70	10.06
40-44.9	5	24.81	14.10	37.37	0.3773	151.59	0.0930	308.37	8.25
45-49.9	5	17.81	10.12	23.27	0.4349	91.04	0.1112	156.78	6.74
50-60	10	23.14	13.15	13.15	1.0000	65.74	0.2000	65.74	5.00
Total		175.99							

Note: x = Age interval in years, n_x = Width of age interval x, D_x = Actual numbers of observed deaths at age x, d_x = Number of individuals dying at age x, based on a cohort of 100, l_x = Survivorship at age x, q_x = Mortality rate or probability of dying at age x, L_x = Number of years lived between age x and x+1, m_x = Age specific death rate for age interval x, T_x = Total number of years lived beyond age x, e^o_x = Expectation of life at age interval x (life expectancy).

Table B.25. Age and Sex Distribution of the Burials from Non Nok Tha, By Group

Age Category	Early Group (EP 1-3, MP 1-3)*				Late Group (MP 4-8)†			
	Male	Female	?Sex	Total	Male	Female	?Sex	Total
Fetal							3	3
NB - 0.9 yrs	3	2	2	7				
1 - 2.9	1	5		6				
3 - 3.9	3	1		4	2	1		3
4 - 4.9	2		1	3		1		1
5 - 5.9		1		1			1	1
6 - 6.9							2	2
7 - 7.9	2			2		1		1
8 - 9.9		1		1				
10 - 11.9			1	1	1			1
12 - 14.9		1		1			1	1
15 - 19.9		2		2	1			1
20 - 24.9	1	4		5		1		1
25 - 29.9		2		2	2	3		5
30 - 34.9	3	2		5	1			1
35 - 39.9	4	1		5	8	6		14
40 - 44.9	2	7		9	3	3		6
45 - 49.9	2			2	5	1		6
≥50	5	4		9	5	3		8
Adult	4	6	1	11	7	12	2	21
Middle-aged	2	2		4	1	6		7
Subadult			3	3				
TOTAL	34	41	8	83	35	38	9	83

* 1966 Burials 38, 62, 64, 70 and 80 are omitted because of inconsistent provenience; Burials 22A, 30A, 43A and 77A are omitted because of unknown provenience.
† Burials 19, 71 and 73 were not located in the current investigation. Burials 22A, 30A, 43A and 77A are omitted because of unknown provenience.

Table B.26. Summary of Estimated Stature for Male Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=42 males) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
1-6	Adult	162.2±4.9 163.6± . 166.3±4.3	5'4" 5'4½" 5'5½"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " "
1-10	Adult	168.9±4.0 168.9±4.1 170.3±3.2	5'6½" 5'6½" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur " " " Left fibula
1-12	35-40	162.9±4.0 165.1±4.0 167.2±3.2	5'4" 5'5" 5'5¾"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
1-16	30-35	160.49±8.0 161.26±7.7 163.52±6.6	5'3¼" 5'3½" 5'4½"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
1-22	40-45	165.8±5.0 168.3± . 173.3±4.6	5'5¼" 5'6¼" 5'8¼"		Non-ethnic Thai-Chinese Mongoloid	Left ulna Left radius Left radius
1-25A	Adult	168.5±8.3 166.4±7.8 169.9±6.8	5'6¼" 5'5½" 5'7"	*	Non-ethnic Thai-Chinese Mongoloid	Right femur " " " "
1-26	30-35	165.0±4.0 165.4±4.1 167.6±3.8	5'5" 5'5" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur " " " Left femur
1-34	40-45	165.0±4.0 167.3±4.0 169.6±3.2	5'5" 5'5¾" 5'6¾"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
1-48	35-40	162.9±4.0 162.8±4.0 164.8±3.2	5'4" 5'4" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
1-50	40-45	177.1±5.0 172.7± . 177.9±4.6	5'9¾" 5'8" 5'10"		Non-ethnic Thai-Chinese Mongoloid	Left radius " " " "
1-51	Adult	164.4±8.8 163.8±8.2 166.6±7.2	5'4¾" 5'4½" 5'5½"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
1-55	35-40	165.9±4.0 170.2±4.0 172.4±3.2	5'5¼" 5'7" 5'7¾"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left femur-tibia
1-65	55+	166.7±10.2 166.6± . 168.9±7.4	5'5¾" 5'5½" 5'6½"	*	Non-ethnic Thai-Chinese Mongoloid	Left humerus " " " "

Table B.26 (cont'd.). Summary of Estimated Stature for Male Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=42 males) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
1-67	20-25	160.7±4.0 162.5±4.0 167.4±3.2	5'3¼" 5'4" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Right femur Right femur-tibia
1-72	45-50	166.8±4.0 167.9±4.0 170.8±3.2	5'5¾" 5'6" 5'7¼"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left femur-tibia
1-77	40-45	159.5±4.0 163.1±4.0 168.4±3.2	5'2¾" 5'4¼" 5'6¼"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left fibula
1-78	45-50	168.9±8.8 166.7±7.8 170.2±6.8	5'6½" 5'5½" 5'7"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
1-81	50-60	169.0±5.0 165.6± . 169.7±4.7	5'6½" 5'5¼" 5'6¾"		Non-ethnic Thai-Chinese Mongoloid	Left ulna " " " "
1-88	50-60	169.6±7.7 167.1±7.3 170.7±6.1	5'6¾" 5'5¾" 5'7¼"	*	Non-ethnic Thai-Chinese Mongoloid	Left femur " " " "
1-90	Adult	167.7±9.5 163.8±9.1 168.9±7.2	5'6" 5'4½" 5'6½"	*	Non-ethnic Thai-Chinese Mongoloid	Right tibia " " " "
"C"	Adult	174.3±10.3 171.5± . 173.3±7.4	5'8½" 5'7½" 5'8¼"	*	Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
2-7	35-40	169.6±5.0 165.97± . 170.9±4.6	5'6¾" 5'5"¼" 5'7¼"		Non-ethnic Thai-Chinese Mongoloid	Left radius " " " "
2-10	30-35	165.9±4.0 163.9±3.0 168.0±3.8	5'5¼" 5'4½" 5'6¼"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur " "
2-23	35-40	170.7±5.0 166.98± . 171.9±4.6	5'7¼" 5'5¾" 5'7¾"		Non-ethnic Thai-Chinese Mongoloid	Left radius " " " "
2-24	Middle age	178.0±4.2 172.4±4.5 175.1±3.3	5'10" 5'8" 5'9"		Non-ethnic Thai-Chinese Mongoloid	Left tibia " " " "
2-26	35-40	159.0±4.9 161.5± . 164.4±4.3	5'2½" 5'3½" 5'4¾"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "

Table B.26 (cont'd.). Summary of Estimated Stature for Male Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=42 males) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
2-27	50-60	165.0±4.0 164.2±4.0 168.0±3.8	5'5" 5'4¾" 5'6¼"		Non-ethnic Thai-Chinese Mongoloid	Right bicondylar femur Rt bicond femur-tibia " "
2-32	25-30	161.2±4.1 161.5±4.2 164.1±3.2	5'3½" 5'3½" 5'4½"		Non-ethnic Thai-Chinese Mongoloid	Right fibula " " " "
2-38	Adult	171.0±4.2 166.6±4.5 170.4±3.3	5'7¼" 5'5½" 5'7"		Non-ethnic Thai-Chinese Mongoloid	Right tibia " " " "
2-41	40-45	162.6±4.0 163.3±4.1 167.9±3.2	5'4" 5'4¼" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Right bicondylar femur " " " Left fibula
2-42	50-60	174.2±8.3 170.0±7.8 174.4±6.8	5'8½" 5'7" 5'8¾"	*	Non-ethnic Thai-Chinese Mongoloid	Right femur " " " "
2-47	45-50	159.1±4.1 159.9±4.2 162.6±3.2	5'2¾" 5'3" 5'4"		Non-ethnic Thai-Chinese Mongoloid	Left fibula " " " "
2-56	25-30	153.9±4.9 158.2± . 161.4±4.3	5'½" 5'2¼" 5'3½"		Non-ethnic Thai-Chinese Mongoloid	Left humerus " " " "
2-61	50-60	163.3±8.3 163.1±7.8 165.8±6.8	5'4¼" 5'4¼" 5'5¼"	*	Non-ethnic Thai-Chinese Mongoloid	Right femur " " " "
2-62	45-50	155.7±4.6 161.7±5.1 169.7±4.7	5'1¼" 5'3¾" 5'6¾"		Non-ethnic Thai-Chinese Mongoloid	Left physiological tibia " " " Left ulna
2-64	35-40	162.0±4.0 162.7±4.1 165.5±3.8	5'3¾" 5'4" 5'5¼"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur " " " Left femur
2-67	35-40	168.3±4.0 168.3±4.1 168.4±3.2	5'6¼" 5'6¼" 5'6¼		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur " " " Right fibula
2-71B	Middle age	160.4±4.9 162.4± . 165.2±4.3	5'3¼" 5'4" 5'5"		Non-ethnic Thai-Chinese Mongoloid	Left humerus " " " "
2-76	35-40	160.8±4.9 162.7± . 165.5±4.3	5'3¼" 5'4" 5'5¼"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "

Table B.26 (cont'd.). Summary of Estimated Stature for Male Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=42 males) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
2-85	45-50	167.4±4.0 170.8±4.0 173.2±3.2	5'6" 5'7¼" 5'8¼"		Non-ethnic Thai-Chinese Mongoloid	Left bicondylar femur Left femur Left femur-tibia
2-89	50-60	167.3±4.9 167.0± . 169.2±4.3	5'6" 5'5¾" 5'6½"		Non-ethnic Thai-Chinese Mongoloid	Right humerus " " " "
2-110	35-40	165.0±4.0 165.4±4.1 167.8±3.8	5'5" 5'5" 5'6"		Non-ethnic Thai-Chinese Mongoloid	Right bicondylar femur " " " Right femur
MEAN[3]/ S.D.	n=32 n=32 n=32	164.8±5.3 165.3±3.5 168.6±3.6	5'4¾" 5'5" 5'6¼"		Non-ethnic Thai-Chinese Mongoloid	
RANGE		153.9-178.0 158.2-172.7 161.4-177.9	5'½"-5'10" 5'2¼"-5'8" 5'3½"-5'10"		Non-ethnic Thai-Chinese Mongoloid	

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series.

[1] An asterisk (*) denotes stature is derived from long limb bone length estimated from segment measurements (Steele and McKern 1969).

[2] Non-ethnic stature formulae (Sjøvold 1990). Thai-Chinese stature formulae (Sangvichien *et al.* 1985). Mongoloid stature formulae (Trotter 1970).

[3] Mean and range do not include statures estimated from segment measurements.

Table B.27. Summary of Estimated Stature for Female Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=40 females) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
1-2	40-45	158.9±5.0 152.9± .	5'2½" 5'¼"		Non-ethnic Thai-Chinese	Right ulna " "
1-4	35-40	157.9±6.8 155.9±5.2	5'2¼" 5'1½"	*	Non-ethnic Thai-Chinese	Left femur " "
1-8	55-60	161.5±4.2 154.7±3.5	5'3½" 5'1"		Non-ethnic Thai-Chinese	Right tibia " "
1-9	Adult	164.1±4.1 161.8±3.5	5'4½" 5'3¾"		Non-ethnic Thai-Chinese	Right fibula Left tibia
1-23	25-30	156.5±4.0 155.5±2.1	5'1¾" 5'1¼"		Non-ethnic Thai-Chinese	Left bicondylar femur Left bicon. femur-tibia
1-24	40-45	154.8±4.9 154.94± .	5'1" 5'1"		Non-ethnic Thai-Chinese	Left humerus " "
1-28	25-30	161.0±4.0 161.5±3.0	5'3½" 5'3¾"		Non-ethnic Thai-Chinese	Left bicondylar femur Left femur
1-30	20-25	160.2±4.2 153.5±3.5	5'3" 5'½"		Non-ethnic Thai-Chinese	Right tibia " "
1-31	25-30	152.6±4.0 152.8±3.0	5'0" 5'¼"		Non-ethnic Thai-Chinese	Left bicondylar femur Left femur`
1-40	55-60	156.9±4.1 160.2±3.0	5'1¾" 5'3"		Non-ethnic Thai-Chinese	Left fibula Right femur
1-41	Middle age	159.4±5.0 152.41± .	5'2¾" 5'0"		Non-ethnic Thai-Chinese	Left radius " "
1-43	35-40	160.4±4.0 160.8±3.0	5'3¼" 5'3¼"		Non-ethnic Thai-Chinese	Left bicondylar femur Left femur
1-44	Middle age	162.0±4.1 158.0±3.5	5'3¾" 5'2¼"		Non-ethnic Thai-Chinese	Left fibula Left tibia
1-47	Middle age	150.2±4.9 152.19± .	4'11¼" 4'12"		Non-ethnic Thai-Chinese	Left humerus " "
1-49	50-60	150.8±8.0 149.3±6.4	4'11¼" 4'10¾"	*	Non-ethnic Thai-Chinese	Left femur " "
1-53	Adult	162.4±8.3 160.3±6.6	5'4" 5'3"	*	Non-ethnic Thai-Chinese	Right femur " "
1-54	50-60	156.0±5.0 149.99± .	5'1½" 4'11"		Non-ethnic Thai-Chinese	Left radius " "
1-59	40-45	143.7±4.9 148.34± .	4'8½" 4'10½"		Non-ethnic Thai-Chinese	Left humerus " "

Table B.27 (cont'd). Summary of Estimated Stature for Female Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=40 females) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
1-62	50-55	149.3±4.0 149.7±2.1	4'10¾" 4'11"		Non-ethnic Thai-Chinese	Left bicondylar femur Left bicon. femur-tibia
1-63	25-30	152.6±4.0 153.0±3.0	5'0" 5'¼"		Non-ethnic Thai-Chinese	Left bicondylar femur Left femur
2-17	Adult	159.4±7.7 152.8±6.7	5'2¾" 5'¼"	*	Non-ethnic Thai-Chinese	Left tibia " "
2-21	40-45	159.3±5.0 153.1± .	5'2¾" 5'¼"		Non-ethnic Thai-Chinese	Right ulna " "
2-31	Adult	162.0±4.1 156.4±4.4	5'3¾" 5'1½"		Non-ethnic Thai-Chinese	Left fibula[2] " "
2-39	50-60	154.8±4.1 151.5±4.4	5'1" 4'11¾"		Non-ethnic Thai-Chinese	Right fibula " "
2-43	35-40	159.0±7.8 157.0±6.2	5'2½" 5'1¾"	*	Non-ethnic Thai-Chinese	Right femur " "
2-45	Adult	147.6±4.1 149.4±3.5	4'10" 4'10¾"		Non-ethnic Thai-Chinese	Right fibula Right tibia
2-48	40-45	152.0±4.0 152.0±3.0	4'11¾" 4'11¾"		Non-ethnic Thai-Chinese	Right bicond femur Right femur
2-52	50-55	153.3±7.7 151.6±6.6	5'¼" 4'11¾"	*	Non-ethnic Thai-Chinese	Left femur " "
2-58	35-40	151.3±10.3 152.8± .	4'11½" 5'¼"	*	Non-ethnic Thai-Chinese	Left humerus " "
2-59	20-25	154.7±4.0 154.8±3.0	5'1" 5'1"		Non-ethnic Thai-Chinese	Right bicond femur Right femur
2-60	25-30	148.7±4.0 149.2±2.1	4'10½" 4'10¾"		Non-ethnic Thai-Chinese	Left bicondylar femur Left bicon femur- tib
2-69	Adult	149.2±6.8 147.7±5.2	4'10¾" 4'10¼"	*	Non-ethnic Thai-Chinese	Right femur " "
2-71A	35-40	144.2±4.9 148.6± .	4'8¾" 4'10½"		Non-ethnic Thai-Chinese	Right humerus " "
2-78	40-45	140.0±4.9 146.14± .	4'7¼" 4'9½"		Non-ethnic Thai-Chinese	Right humerus " "
2-79	18-23	147.0±4.0 150.1±2.1	4'9¾" 4'11"		Non-ethnic Thai-Chinese	Left bicondylar femur Left bicond. femur-tib
2-83	30-35	149.3±4.0 150.2±2.1	4'10¾" 4'11¼"		Non-ethnic Thai-Chinese	Left bicondylar femur Rt bicond. femur- tib

Table B.27 (cont'd). Summary of Estimated Stature for Female Burials from Non Nok Tha, Thailand

Burial ID.	Age	Stature (N=40 females) Cm.	Ft./In.	Seg	Regression Formula[2]	Side/Bone(s)
2-88	Middle age	158.3±4.0 155.8±2.1	5'2¼" 5'1¼"		Non-ethnic Thai-Chinese	Left bicondylar femur Rt bicond. femur- tib
2-103	40-45	143.7±4.9 148.34± .	4'8½" 4'10½"		Non-ethnic Thai-Chinese	Right humerus " "
2-117	50+	163.0±5.0 155.1± .	5'4¼" 5'1"		Non-ethnic Thai-Chinese	Left ulna Left radius
2-124	35-40	152.9±4.0 154.9±2.1	5'¼" 5'1"		Non-ethnic Thai-Chinese	Right bicond. femur Rt bicond. femur- tib
Mean[3]/ S.D.	n=32 n=32	154.2±6.5 153.4±4.0	5'¾" 5'¼"		Non-ethnic Thai-Chinese	
Range	n=32 n=32	140.0-164.1 146.1-161.8	4'7½"-5'4¼" 4'9½"-5'3¾"		Non-ethnic Thai-Chinese	

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series.

[1] An asterisk (*) denotes stature is derived from long limb bone length estimated from segment measurements (Steele and McKern 1969).

[2] Estimated length from a nearly complete element.

[3] Non-ethnic stature formulae (Sjøvold 1990). Thai-Chinese stature formulae (Sangvichien *et al.* 1985). Mongoloid stature formulae (Trotter 1970).

[4] Mean and range do not include statures estimated from segment measurements.

Table B.28. Hypoplasia in Subadult (< 15 years) Permanent Teeth from Non Nok Tha

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
MAXILLARY								
M2	3		2		1		6	
absent	2	66.7	1	50.0	1	100.0	4	66.7
horizontal line	1	33.3	1	50.0	0	0.0	2	33.3
M1	3		3		1		7	
absent	2	66.7	3	100.0	1	100.0	6	85.7
horizontal line	1	33.3	0	0.0	0	0.0	1	14.3
P4	0		1		0		1	
present			0	0.0			0	0.0
P3	1		1		0		2	
absent	0	0.0	1	100.0			1	50.0
horizontal line	1	100.0	0	0.0			1	50.0
C	2		1		2		5	
absent	1	50.0	1	100.0	2	100.0	4	80.0
horizontal line	1	50.0	0	0.0	0	0.0	1	20.0
I2	2		1		0		3	
absent	1	50.0	1	100.0			2	66.7
horizontal line	1	50.0	0	0.0			1	33.3
I1	5		3		2		10	
absent	3	60.0	3	100.0	2	100.0	8	80.0
horizontal line	2	40.0	0	0.0	0	0.0	2	20.0
TOTAL MAXILLARY	16		12		6		34	
absent	9	56.3	11	91.7	6	100.0	26	76.5
horizontal line	7	43.7	1	8.3	0	0.0	8	23.5
MANDIBULAR								
M3	0		1		0		1	
present			0	0.0			0	0.0

Table B.28 (cont'd). Hypoplasia in Subadult (< 15 years) Permanent Teeth from Non Nok Tha

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
M2	0		2		0		2	
present			0	0.0			0	0.0
M1	5		5		5		15	
absent	4	80.0	5	100.0	5	100.0	14	93.3
color change	1	20.0	0	0.0	0	0.0	1	6.7
P4	0		1		0		1	
present			0	0.0			0	0.0
P3	1		0		0		1	
present	0	0.0					0	0.0
C	2		2		1		5	
present	0	0.0	0	0.0	0	0.0	0	0.0
I2	3		2		0		5	
absent	1	33.3	2	100.0			3	60.0
horizontal line	2	66.7	0	0.0			2	40.0
I1	0		4		1		5	
present			0	0.0	0	0.0	0	0.0
TOTAL MAND.	11		17		7		35	
absent	8	72.7	17	100.0	7	100.0	32	91.4
horizontal line	2	18.2	0	0.0	0	0.0	2	5.7
color change	1	9.1	0	0.0	0	0.0	1	2.9
COMBINED JAWS								
Molars	11		13		7		31	
absent	8	72.7	12	92.3	6	100.0	27	87.1
horizontal line	2	18.2	1	16.7	0	0.0	3	9.7
color change	1	9.1	0	0.0	0	0.0	1	3.2
Premolars	2		3		0		5	
absent	1	50.0	3	100.0			4	80.0
horizontal line	1	50.0	0	0.0			1	20.0

Table B.28 (cont'd). Hypoplasia in Subadult (< 15 years) Permanent Teeth from Non Nok Tha

Tooth	Male (O)		Female (O)		?Sex (O)		Total (O)	
	A	%	A	%	A	%	A	%
Canines	4		3		3		10	
absent	3	75.0	3	100.0	3	100.0	9	90.0
horizontal line	1	25.0	0	0.0	0	0.0	1	10.0
Incisors	10		10		3		23	
absent	5	50.0	10	100.0	3	100.0	18	78.3
horizontal line	5	50.0	0	0.0	0	0.0	5	21.7
OVERALL	27		29		13		69	
absent	17	63.0	28	96.6	13	100.0	58	84.1
horizontal line	9	33.3	1	3.4	0	0.0	10	14.5
color change	1	3.7	0	0.0	0	0.0	1	1.4

Note: A=affected, O=Observed. 13 individual burials are represented: 5 males, 5 females, 3 ?sex.

Table B.29. Hypoplasia Prevalence in Adult (>15 years) Permanent Teeth from Non Nok Tha

Jaw Tooth Observed	Male		Female		Total	
	A	%	A	%	A	%
MAXILLARY						
M3	22		23		45	
absent	20	90.9	20	87.0	40	88.9
horizontal line	2	9.1	0	0.0	2	4.4
hypocalcification	0	0.0	3	13.0	3	6.7
M2	42		44		86	
absent	34	81.0	40	90.9	74	86.0
horizontal line	6	14.3	0	0.0	6	7.0
non-linear pits	2	4.8	0	0.0	2	2.3
hypocalcification	0	0.0	4	9.1	4	4.7
M1	38		51		89	
absent	36	94.7	46	90.2	82	92.1
horizontal line	2	5.3	1	2.0	3	3.4
hypocalcification	0	0.0	4	7.8	4	4.5
P4	39		45		84	
absent	34	87.2	41	91.1	75	89.3
horizontal line	4	10.3	0	0.0	4	4.8
non-linear pits	1	2.6	0	0.0	1	1.2
hypocalcification	0	0.0	4	8.9	4	4.8
P3	37		42		79	
absent	34	91.9	37	88.1	71	89.9
horizontal line	3	8.1	2	4.8	5	6.3
hypocalcification	0	0.0	3	7.1	3	3.8
C	32		33		65	
absent	24	75.0	27	81.8	51	78.5
horizontal line	0	0.0	5	15.2	5	7.7
non-linear pits	7	21.9	1	3.0	8	12.3
single pit	1	3.1	0	0.0	1	1.5

Table B.29 (cont'd). Hypoplasia Prevalence in Adult (>15 years) Permanent Teeth from Non Nok Tha

Jaw Tooth Observed	Male		Female		Total	
	A	%	A	%	A	%
I2	22		24		46	
absent	21	95.5	18	75.0	39	84.8
horizontal line	1	4.5	5	20.8	6	13.0
horizontal pits	0	0.0	1	4.2	1	2.2
I1	20		25		45	
absent	17	85.0	23	92.0	40	88.9
horizontal line	3	15.0	2	8.0	5	11.1
TOTAL MAXILLARY	253		284		537	
absent	216	85.4	254	89.4	470	87.5
horizontal line	25	9.9	11	3.9	36	6.7
horizontal pits	0	0.0	1	0.4	1	0.2
non-linear pits	11	4.3	0	0.0	11	2.0
single pit	1	0.4	0	0.0	1	0.2
hypocalcification	0	0.0	18	6.3	18	3.3
MANDIBULAR						
M3	35		34		69	
absent	33	94.3	34	100.0	67	97.1
non-linear pits	2	5.7	0	0.0	2	2.9
M2	43		41		84	
absent	41	95.3	39	95.1	80	95.2
horizontal line	0	0.0	1	2.4	1	1.2
non-linear pits	2	4.7	0	0.0	2	2.4
hypocalcification	0	0.0	1	2.4	1	1.2
M1	40		47		87	
absent	36	90.0	45	95.7	81	93.1
horizontal line	2	5.0	1	2.1	3	3.4
non-linear pits	2	5.0	0	0.0	2	2.3
hypocalcification	0	0.0	1	2.1	1	1.1

Table B.29 (cont'd). Hypoplasia Prevalence in Adult (>15 years) Permanent Teeth from Non Nok Tha

Jaw Tooth Observed	Male		Female		Total	
	A	%	A	%	A	%
P4	41		40		81	
absent	38	92.7	38	95.0	76	93.8
non-linear pits	2	4.9	0	0.0	2	2.5
hypocalcification	1	2.4	2	5.0	3	3.7
P3	40		36		76	
absent	38	95.0	33	91.7	71	93.4
horizontal line	2	5.0	2	5.6	4	5.3
hypocalcification	0	0.0	1	2.8	1	1.3
C	40		40		80	
absent	32	80.0	27	67.5	59	73.8
horizontal line	1	2.5	4	10.0	5	6.3
vertical groove	0	0.0	2	5.0	2	2.5
non-linear pits	7	17.5	5	12.5	12	15.0
hypocalcification	0	0.0	2	5.0	2	2.5
I1	20		27		47	
absent	18	90.0	24	88.9	42	89.4
horizontal line	1	5.0	1	3.7	2	4.3
hypocalcification	1	5.0	2	7.4	3	6.4
I1	15		21		36	
absent	13	86.7	21	100.0	34	94.4
horizontal line	1	6.7	0	0.0	1	2.8
hypocalcification	1	6.7	0	0.0	1	2.8
TOTAL MAND.	285		273		558	
absent	249	87.4	259	94.9	508	91.0
horizontal line	9	3.2	7	2.6	16	2.9
vertical groove	2	0.7	0	0.0	2	0.4
non-linear pits	20	7.0	0	0.0	20	3.6
hypocalcification	5	1.8	7	2.6	12	2.2

Table B.29 (cont'd). Hypoplasia Prevalence in Adult (>15 years) Permanent Teeth from Non Nok Tha

Jaw Tooth Observed	Male		Female		Total	
	A	%	A	%	A	%
COMBINED JAWS						
Molars	220		240		460	
absent	200	90.9	224	93.3	424	92.2
horizontal line	12	5.5	3	1.3	15	3.3
non-linear pits	8	3.6	0	0.0	8	1.7
hypocalcification	0	0.0	13	5.4	13	2.8
Premolars	157		163		320	
absent	144	91.7	149	91.4	293	91.6
horizontal line	9	5.7	4	2.5	13	4.1
non-linear pits	3	1.9	0	0.0	3	0.9
hypocalcification	1	0.6	10	6.1	11	3.4
Canines	72		73		145	
absent	56	77.8	54	74.0	110	75.9
horizontal line	1	1.4	9	12.3	10	6.9
vertical groove	0	0.0	2	2.7	2	1.4
non-linear pits	14	19.4	6	8.2	20	13.8
single pit	1	1.4	0	0.0	1	0.7
hypocalcification	0	0.0	2	2.7	2	1.4
Incisors	77		97		174	
absent	69	89.6	86	88.7	155	89.1
horizontal line	6	7.8	8	8.2	14	8.0
horizontal pits	0	0.0	1	1.0	1	0.6
hypocalcification	2	2.6	2	2.1	4	2.3
OVERALL	538		557		1095	
absent	465	86.4	513	92.1	978	89.4
horizontal line	34	6.3	18	3.2	52	4.7
vertical groove	2	0.4	0	0.0	2	0.2
pits (all)	32	5.9	1	0.2	33	3.0
hypocalcification	5	0.9	25	4.5	30	2.7

Note: A=affected, O=observed, sides combined. Includes 77 individuals: 37 males, 40 females.

Table B.30. Dental Enamel Hypoplasia Measurements* in Non Nok Tha Permanent Teeth

Burial	Sex	Age	Period	Tooth†	Distance	Age‡	Tooth†	Distance	Age‡
1-12A	?Male	Adult		LLP4	1.27	6.044	LLC	2.17	5.224
				LLI1	1.94	2.997	LRI2	2.80	2.719
				LRC	**2.38**	**5.100**	LRP4	1.95	5.613
1-18	Female	35-40	MP 4	LLC	3.06	4.700	LRC	3.19	4.624
1-25B	Female	Adult	MP 1	LRM1	3.59	1.917			
1-28	Female	25-30	MP 2	URC	1.39	5.153	URC	2.24	4.635
				URI2	1.94	3.831	URI2	2.24	3.712
				ULI2	1.16	4.140	ULI2	2.13	3.755
				ULC	1.29	5.214	ULP3	1.85	5.025
				ULM1	1.79	2.785	**LRC**	**2.63**	**4.953**
				LRP3	2.65	4.168			
1-31	Female	25-30	MP 5	URM2	2.67	5.831	URM1	2.19	2.576
				URP4	3.09	4.588	URP3	2.86	4.520
				ULP4	2.61	4.817	ULM1	2.46	2.454
				ULM2	1.46	6.588			
1-44A	?Male	8-9	MP 7	URM1	2.19	2.576	ULC	2.58	4.428
				ULP3	3.74	4.080	**LLM1**	**1.8**	**2.736**
				LLI2	5.40	1.622	LLI2	5.99	1.373
				LRI2	5.58	1.546			
1-48	Male	35-40	MP 4	URM2	3.34	5.413	URM1	4.10	1.709
				URP4	2.02	5.098	URC	2.32	4.586
				ULC	2.97	4.190	ULP3	2.00	4.950
				ULM2	2.92	5.675	LLM2	1.14	6.306
				LLM1	1.93	2.677	LLP4	1.91	5.689
				LRP4	1.83	2.535	LLM1	2.24	5.638
1-55	Male	35-40	MP 3	URM2	3.23	5.481	URM1	4.44	1.555
				URP4	2.68	4.783	URP3	3.61	4.145
				URC	3.97	3.581	ULP3	2.73	4.585
1-58	Female	6-8	MP 5	URM2	2.30	6.063			

Table B.30 (cont'd.). Dental Enamel Hypoplasia Measurements* in Non Nok Tha Permanent Teeth

Burial	Sex	Age	Period	Tooth†	Distance	Age‡	Tooth†	Distance	Age‡
1-63	Female	25-30	MP 3	URM2	1.80	6.375	URM1	1.02	3.107
				URP4	2.94	4.659	URP3	1.07	5.415
				URC	1.75	4.934	URI1	2.34	3.522
				ULI1	2.34	3.522	ULI2	4.42	2.847
				ULI2	0.98	4.211	ULP3	1.48	5.210
				ULP4	1.64	5.279	ULM1	1.64	2.826
				ULM2	1.64	6.475	LLM2	2.71	5.418
				LLM1	0.64	3.267	LLP4	1.53	5.879
				LLP3	1.70	4.771	LLC	1.92	5.371
				LLI2	1.04	3.461	LRI2	1.38	3.318
				LRC	2.22	5.194	LRP3	1.48	4.911
				LRP4	1.78	5.720			
1-67	Male	20-25	MP 2	**URC**	**3.67**	**3.764**	URI1	3.54	2.995
				ULI1	3.55	2.990	**ULC**	**4.32**	**3.367**
				LLM1	1.36	2.938	LLC	4.83	3.659
				LRC	4.75	3.706	LRP3	3.74	3.477
				LRM1	0.96	3.121			
1-77	Male	40-45	MP2	URM2	1.26	6.713			
				ULI1	3.14	3.170	ULI1	4.14	2.731
				ULM2	1.37	6.644			
				LLM2	1.57	6.063	LLM1	2.54	2.397
				LLP3	1.92	4.632	LLC	3.08	4.688
				LRC	3.08	4.688			
2-4	?	5-6	MP 6	LRC	1.89	5.388			
2-23	Male	35-40	MP 5	ULI2	3.88	3.061	ULC	2.87	4.251
2-25	Male	9-11	MP 6	URM2	2.01	6.244	URI2	1.99	3.811
				URI1	5.71	2.041	URI1	6.08	1.878
					2.88	3.285	URI1	1.02	4.102
				ULI1	6.08	1.878	ULI1	4.71	2.480
					3.20	3.144	ULI1	1.47	3.904

Table B.30 (cont'd.). Dental Enamel Hypoplasia Measurements* in Non Nok Tha Permanent Teeth

Burial	Sex	Age	Period	Tooth†	Distance	Age‡	Tooth†	Distance	Age‡
2-33	Male	17-20	MP 4	LRI1	2.58	2.699	LRI1	1.11	3.383
				LRI2	3.20	2.550	LRI2	2.02	3.048
				LRC	4.82	3.665	LRC	3.57	4.400
2-52	Female	50-55	EP 3	ULI2	3.84	3.077			
2-64	Male	35-40	MP 1	**URC**	**3.74**	**3.721**	**ULC**	**2.62**	**4.403**
				LLC	**2.84**	**4.829**	**LRC**	**3.77**	**4.282**
2-74	Female	17-22	MP 1	LLC	4.32	3.959	LRC	4.31	3.965
2-98	Female	Adult	MP 5	LLC	3.57	4.400	LLC	2.10	5.265
2-110	Male	35-40	MP 1	ULP3	1.08	5.410	ULP4	1.08	5.546
				ULM2	1.17	6.769			
2-124	Female	35-40	MP 4	ULC	4.36	3.343			
2-M125	Female	30-40	EP 1	URC	2.55	4.446	URI2	2.25	3.708
				URI1	2.67	3.377	**ULI2**	**2.56**	**3.585**
				U2LC	**2.35**	**4.568**			

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series. * Distance of the defect from the cemento-enamel junction (to the nearest 0.01 mm). EP=Early Period, MP=Middle Period, LP=Late Period. † U=upper, L=lower; R=right, L=left; I=incisor, C=canine, P=premolar, M=molar. ‡ Calculated using Murray and Murray 1985. **Bold** indicates non-linear defects.

Table B.31. Cranial Vault Thickness (mm) in the Adult Skulls from Non Nok Tha, Thailand (Listed by Individual Burial Number)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
FEMALES													
1-2	40-45	9	8	9	9	8	11					0	R+L+
1-8	55-60	4	4	4	5	6	5	5		5	5	0	R-L-
1-17	MA			7	7	8		7		7		0	
1-18	40-45	7	5	7	7	6	7	7	7	8			
1-20A	40-45	6	5	7	6	6	8	8	6	6	9	C H	R-L-
1-23	25-30	7	7	4	5	8	3†	4	6	4	9	0	R-L-
1-24	40-45	4	4	6	9	8	5	5			8	0	R+L+
1-28	25-30		7	6	5	6	5	5	5			0	L-
1-31	25-30	7	6	7	8	6	8	8	5	5	8	0	R-L-
1-40	55-60	6		7	3			4		6		H	
1-43	40-45	7	7	7	9	5	9	8		5	8	0	R-L-
1-44	MA	6	7	7	6						8	0	R-L-
1-49	50-60		6	6	5	7	5					0	R-L-
1-59	50+		7	6	7	7	7	7	6			H	R-
1-62	OLD	4		5	6	7	6	6	9		9	0	R-
1-63	25-30	4	4	5	4	4	5	5	4	4	6	0	R-L-
2-4	40-45	7	6	9	7	6	7	7	8		7	0	R-L-
2-20	20-25	6	5	6	5	6	8	8	6	6	9	0	R+L+

Table B.31 (cont'd.). Cranial Vault Thickness (mm) in the Adult Skulls from Non Nok Tha, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
2-22	40-45	5	6	5	5	10*	8	7	5	5	9	0	
2-39	50-60	5	5	5	5	6	6	6			7	0	R+L+
2-43	35-40	6	6	7	7	8		6		7	8	0	L-
2-43A	MA				4	7	7	8			6	0	
2-48	40-45	6	6	8	9	9	8	8	5			0	R-L-
2-57	ADULT	6	6	7	7	8	6	6	6		8	0	R-L-
2-60	25-30		6	6	5	6	6	6	4	4	7	0	
2-71A	35-40	7	8	5	5	8	8	9	4	4	4	0	R-
2-74	17-22	4	5	6	8	4	6	6	4	5	8	0	R-L-
2-78	40-45	7	6	7	8	7	7	7	7	7	8	0	R-L-
2-79	18-23	6	7	7	8	9	7	7	4	4	7		R+L+
2-83	30-35				5		6	7					R-L-
2-88	MA					8		6				0	
2-103	40-45	6	7	6	7	6	7	7	7	7	8	H	R-L-
2-111	ADULT									5			
2-114	YA				5		5		4		6		
2-117	50+	7	7	7	5	10	8	8	6	6	10	H	
2-123	ADULT	6	6	7	6	8	8	9	5	5	8	F A	L-
2-124	35-40	4	5	4	4	4	6	6	7		5	F H	R-

Table B.31 (cont'd.). Cranial Vault Thickness (mm) in the Adult Skulls from Non Nok Tha, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
2-M125	30-40	5	6	6	6	6	7	9	4		7	F H	
1-431	ADULT		7	6	4	6							
MALES													
1-8A	40-45	8	8	8	9	8	8		8	8	11		R-L-
1-10	ADULT	4		3	4	7	4					0	
1-12	35-40				8	10	6	6	7	7	9	F H	R-
1-16	30-35		7	7				7	8	9		0	L-
1-22	45-50		6	8	7	9	6	7	7	7	10	F H	L-
1-26	30-35	9	9	8	9	8	7	7	8	8	10	H	
1-30A	40-45		5	4			6	5			10		
1-34	40-45	6	6	5	5	7	7	5	7		7		R-L-
1-48	35-40	6	6	6	9	9	7	7	5	4	9	C H	R-L-
1-55	35-40	8	8	8	6	10	8	8	5	5	11	0	R-L-
1-65	55+	6			8	8	6		9	9	9	H	R-
1-67	20-25	4	4	4	3	4	4				4	0	R-L-
1-77	40-45	7	6	8	9	4	8	8	7	7	9	C H	R+L+
1-78	45-50	7			6							0	R-
1-80	45-50								10	12		0	

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Table B.31 (cont'd.). Cranial Vault Thickness (mm) in the Adult Skulls from Non Nok Tha, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
1-88	55-60	4	5		7	5	4	5	5	5	4	0	R-L-
2-1	45-50	6	5	7	7	7	8	8				0	
2-3	50-60	5	6	6	6	7	7		7		8	0	R-
2-9	40-45	9	9	12	11	11	10	11	10	10	12	H	R-
2-10	40-45						8	8	5	5	8	C H	R-L-
2-23	35-40	6	6	6	7			6		5	7	0	L-
2-26	35-40	4	5	5		6	4	5	4		6	C H	
2-27	50-60	5	7	7	6	6	6	7	6	7	8	0	L-
2-32	25-30	3	4	6	6	5	5	5	8	8	5	H	R-L-
2-33	17-20	4	4	6	8	5	5	6	5	5	9	0	R-L-
2-41	40-45	8	7	9	8	9	10	10	8	7		0	R-L-
2-42	50-60	7	8	8	8	7	9	9	7	9	9	0	R-L-
2-47	45-50	5	5	5	6	6	5	5	7	5	9	0	R-L-
2-49	50-60				5		6					0	
2-52	50-55	8	8	7	8		6	9			10		
2-55	35-40	5	6	10	9	8	9	9	5	5	6	0	R-L-
2-56	25-30		5		6	6		6		8	8	F H	R-L-
2-61	OLD	7	7	9	8		7	6	7	6	9	0	R-L-
2-62	45-50	9	10	10*	10	7	9	9	8	8	11		R-L-

Table B.31 (cont'd.). Cranial Vault Thickness (mm) in the Adult Skulls from Non Nok Tha, Thailand (Listed by Individual)

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	Cribra Orbitalia
No.	Age	Rt	Lt				Rt	Lt	Rt	Lt			
2-64	35-40	6	6	6	10	10	7	7	7	7	10	0	R-L-
2-70	50-60		6	7	7	9	7	7	7	7	8	F H	
2-71B	Middle	6	6	7	7	8	6	7	7	8	9	C H	R-L-
2-73	Middle	9						8				0	
2-73A	Middle-old		9										
2-76	35-40	6	7	8	9	10	9	8	7	7	9		
2-89	50-60	7	7	8	7	10	8	10	5	5		C H	R+
2-90	50-60	7	8	8	8	10	7	7	7	5	10	0	R-L-
2-110	30-35	6	6	7	8	12*	6	5	8	8	10	H	R-
?SEX													
1-68	ADULT						9					X	
2-18	>35					6	7	7			6	0	

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series. C=coarse, F=fine, H=healed, A=active, R=Right, L=Left, 0=absent, +=present, -=absent. * Fusion of sutures may account for increased thickness. † Abnormally low value, not used in metric analysis.

Table B.32. Cranial Vault Thickness (in mm) in Subadults from Non Nok Tha, Thailand

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	*Cribra Orbitalia*
No.	Age	Rt	Lt				Rt.	Lt.	Rt	Lt			
2-12	9-12 Mos	1	1	5								0	R-L-
2-121	9-12 Mos		1			2	2	2			2		R-L-
2-94	12-18 Mos			2			3	3				0	
2-82	12-18 Mos		2	2							3		L-
2-16	12-18 Mos			2		3		2				0	
1-84	12-18 Mos											0	
1-29	2-3						3				3	0	R-L-
1-35	2-3			4	2	3						0	R-
2-14	2-4	4	4	6	4	5‡	3	4			3	F A	L-
2-15	3-4	3	2	3		2		3			3	0	
2-72	3-4	2		3	2	3	2					0	L-
1-46	3-4		3	3	3	3		3				0	
1-57	3-4	4									4	0	L-
2-81	3-4	3		3	3	4	4				3	0	R-L-
2-112	3-5	4	3	4	3	4	4	5	3	3	4	0	R-L-
2-125	3-5					3	2				4		
2-35	3-5			3	3	3		3		3	4	0	
2-96	4-5	3		3		4					4		

Table B.32 (cont'd). Cranial Vault Thickness (in mm) in Subadults from Non Nok Tha, Thailand

Burial		Frontal Eminence		Midfrontal	Bregma	Obelion	Parietal Eminence		Asterion		Lambda	Vault Porosis	*Cribra Orbitalia*
No.	Age	Rt	Lt				Rt.	Lt.	Rt	Lt			
2-2	5-6				5							0	
2-36	5-6	3	4	4		3	3				4	0	
2-5	6-7	2	3	5	4	3	5	4			5	0	
1-7	6-8			9									
2-34	7-8	3	3	4	5	2	4	4	4	4	6	0	R-L-
1-44A	8-9	3	3	5	4	3	3				4	0	
2-29	7	3	3	3	3			3				0	
1-74	8-10	7		7			9				7	0	
2-25	9-11						9	6-7					
2-116	12-14							9	6		6		

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series. C=coarse (>0.5 mm), F=fine (< 0.5 mm), H=healed, A=active, R=Right, L=Left, 0=absent, +=present, -=absent. ‡ craniosynostosis of the sagittal suture.

Table B.33. Cranial Vault Constituent Bone Thicknesses and Ratios, in Individuals from Non Nok Tha

Burial				Vault Bone	Maximum Thickness[1]	Constituents[2]			Diploe/Thickness[3] %	Ratio Diploe:Ccompact[4]
No.	Sex	Age	Period			Inner	Diploe	Outer		
1-2	F	40-45	M2	P	11	1.00	2.06	6.95	18.7	0.26:1
1-8	F	55-60	M1	P	5	1.03	2.78	1.73	55.6	1.01:1
1-12	M	35-40	M5	F	10	2.58	4.20	2.85	42.0	0.77
1-17	F	Mid-aged	M4	P	7	1.17	3.53	2.37	50.4	1.00
1-22	M	40-45	M4	F	8	1.35	2.95	2.34	36.9	0.8
1-28	F	25-30	M2	P	5	1.46	3.16	1.83	63.2	0.96
1-29	F	2-3	M2	P	3	0.57	1.42	1.87	47.3	0.58
1-59	F	40-45	M2	P	7	2.01	3.34	2.35	47.7	0.77
1-65	M	55+	M4	F	8	2.08	4.21	1.78	52.7	1.09
1-68	?	Adult	M1	P	9	0.59	3.53	1.45	39.2	1.73
1-74	F	8-10	M3	F	7	0.50	4.07	1.31	58.1	2.24
1-78	M	45-50	M4	F	7	2.24	3.58	2.46	51.1	0.76
1-84	F	1-1.5	E3	F	4	0.46	2.90	1.11	72.5	1.85
2-1	F	45-50	M6	P	8	1.36	3.58	2.12	44.8	1.03
2-9	M	35-40	M4	P	10	2.16	6.47	2.60	64.7	1.36
2-14	M	2-3	E1	F	6	1.52	4.22	1.24	70.3	1.53
2-25	M	9-11	M6	P	7	1.36	4.11	1.47	58.7	1.45
2-32	M	25-30	M4	P	5	1.04	1.19	2.75	23.8	0.31
2-36	F	5-6	E2	F	4	0.89	1.92	0.96	48.0	1.04
2-41	M	40-45	M1	P	10	2.57	5.22	1.78	52.2	1.20

Table B.33 (cont'd). Cranial Vault Constituent Bone Thicknesses and Ratios, in Individuals from Non Nok Tha

Burial				Vault Bone	Maximum Thickness[1]	Constituents[2]			Diploe/Thickness[3] %	Ratio Diploe:Ccompact[4]
No.	Sex	Age	Period			Inner	Diploe	Outer		
2-43	F	35-40	M6	P	6	1.71	3.22	1.46	53.7	1.02
2-43	F	35-40	M6	F	6	1.45	3.44	1.28	57.3	1.26
2-43A	F	Mid-aged		P	7	1.26	2.79	2.31	39.9	0.78
2-48	F	40-45	M6	P	8	1.52	3.06	1.77	38.3	0.93
2-49	M	50-60	M5	P	6	1.52	1.93	1.70	32.2	0.60
2-56	M	25-30	M6	F	5	2.00	1.63	2.11	32.6	0.40
2-57	F	Adult	M6	P	6	1.94	2.30	1.81	38.3	0.61
2-60	F	25-30	M6	F	6	1.59	1.69	2.15	28.2	0.45
2-61	M	50-60	E1	P	7	1.32	3.97	1.79	56.7	1.28
2-70	M	50-60	M6	F	7	1.18	4.71	1.71	67.3	1.63
2-73	M	Adult	M1	P	8	1.43	4.80	1.61	60.0	1.58
2-73A	M	Mid-old		F	9	3.44	3.77	2.73	41.9	0.61
2-76	M	35-40	M1	P	8	2.20	3.09	1.66	38.6	0.80
2-78	F	40-45	E2	P	7	1.90	3.56	1.91	50.9	0.93
2-89	M	50-60	E2	P	10	1.48	5.52	2.81	55.2	1.29
2-90	M	50-60	E3	P	7	1.34	4.19	2.01	59.9	1.25
2-124	F	35-40	M4	P	6	1.79	2.10	2.56	35.0	0.48
2-M125	F	30-40	E1	P	8	1.35	4.48	2.68	56.0	1.11

Note: Burial number '1-X' denotes 1966 series, '2-X' denotes 1968 series.
[1] Maximum thickness measured to the nearest mm, at the closest vault landmark (i.e. mid-frontal, frontal eminence, etc.). [2] Constituents, measured to the nearest 0.01 mm, at a broken edge as close as possible to the vault landmarks. [3] After Reynolds 1965. [4] After Webb 1989:15.

Table B.34 Prevalence of Premortem Tooth Loss in Adult Permanent Teeth from Non Nok Tha

Jaw Tooth	Male		Female		Total (♂+♀)	
	A/O	%	A/O	%	A/O	%
Maxillary						
M3	5/37	13.5	8/40	20.0	13/77	16.8
M2	3/49	6.1	2/49	4.1	5/98	5.1
M1	2/51	3.9	0/54	0.0	2/105	1.9
P4	3/55	5.5	0/57	0.0	3/112	2.7
P3	2/57	3.5	•1/56	1.8	3/113	2.7
C	2/55	3.6	•3/50	6.0	5/105	4.8
I2	3/53	5.7	•2/48	4.2	5/101	5.0
I1	3/50	6.0	0/50	0.0	3/100	3.0
M + P	15/249	6.0	11/256	4.3	26/505	5.1
C + I	8/158	5.1	5/148	3.4	13/306	4.2
Total Maxillary	23/407	5.7	16/404	4.0	39/811	4.8
Mandible						
M3	7/51	13.7	5/50	10.0	12/101	11.9
M2	11/59	18.6	7/58	12.1	18/117	15.4
M1	13/57	22.8	7/59	11.9	20/116	17.2
P4	4/56	7.1	3/57	5.3	7/113	6.2
P3	3/60	5.0	2/56	3.6	5/116	4.3
C	4/62	6.5	0/55	0.0	4/117	3.4
I2	5/55	9.1	2/50	4.0	7/105	6.7
I1	9/57	15.8	4/45	8.9	13/102	12.7
M + P	38/283	13.4	24/280	8.6	62/563	11.0
C + I	18/174	10.3	6/150	4.0	24/324	7.4
Total Mandibular	56/457	12.3	30/430	7.0	86/887	9.7
OVERALL	79/864	9.1	46/834	5.5	125/1698	7.4

Note: A=affected, O=observed. Observed teeth includes teeth present, teeth lost pre-mortem and post-mortem, roots, evulsed and impacted; agenetic and unerupted teeth are not included. 82 individuals are included: 40 males, 42 females. •One tooth in each class, from a single individual, possibly evulsed.

Table B.35. Prevalence of Caries in Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
MAXILLARY						
M3	23		26		49	
absent	22	95.7	24	92.3	46	93.9
huge caries	1	4.3	2	7.7	3	6.1
M2	42		46		88	
absent	40	95.2	42	91.3	82	93.2
occlusal fissure	1	2.4	1	2.2	2	2.3
interproximal-distal	1	2.4	1	2.2	2	2.3
crown - buccal	0	0.0	1	2.2	1	1.1
huge	0	0.0	1	2.2	1	1.1
M1	45		53		98	
absent	43	95.6	53	100.0	96	98.0
interproximal -distal	1	2.2	0	0.0	1	1.0
huge caries	1	2.2	0	0.0	1	1.0
P4	45		52		97	
absent	45	100.0	51	98.1	96	99.0
interproximal-distal	0	0.0	1	1.9	1	1.0
P3	46		46		92	
present	0	0.0	0	0.0	0	0.0
C	36		35		71	
present	0	0.0	0	0.0	0	0.0
I2	25		28		53	
present	0	0.0	0	0.0	0	0.0
I1	24		27		51	
absent	23	95.8	26	96.3	49	96.1
occlusal - gross	0	0.0	1	3.7	1	2.0
interproximal-distal	1	4.2	0	0.0	1	2.0

Table B.35 (cont'd). Prevalence of Caries in Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
TOTAL MAXILLARY	286		313		599	
absent	280	97.9	305	97.4	585	97.7
occlusal (all)	1	0.3	2	0.6	3	0.5
interproximal (all)	3	1.0	2	0.6	5	0.8
crown (all)	0	0.0	1	0.3	1	0.2
huge	2	0.7	3	1.0	5	0.8
MANDIBULAR						
M3	39		40		79	
absent	39	100.0	35	87.5	74	93.7
occlusal fissure	0	0.0	1	2.5	1	1.3
crown-lingual	0	0.0	1	2.5	1	1.3
huge caries	0	0.0	3	7.5	3	3.8
M2	47		48		95	
absent	44	93.6	45	93.8	89	93.7
occlusal fissure	1	2.1	1	2.1	2	2.1
occlusal gross	1	2.1	0	0.0	1	1.1
interproximal distal	0	0.0	2	4.2	2	2.1
buccal crown	1	2.1	0	0.0	1	1.0
M1	42		51		93	
absent	41	97.6	49	96.1	90	96.8
occlusal fissure	0	0.0	1	2.0	1	1.1
buccal crown	0	0.0	1	2.0	1	1.1
huge	1	2.4	0	0.0	1	1.1
P4	42		46		88	
absent	41	97.6	45	97.8	86	97.7
interproximal-mesial	1	2.4	0	0.0	1	1.1
interproximal distal	0	0.0	1	2.2	1	1.1

Table B.35 (cont'd). Prevalence of Caries in Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
P3	44		41		85	
absent	42	95.5	40	97.6	82	96.5
interproximal-mesial	0	0.0	1	2.4	1	1.2
interproximal distal	2	4.5	0	0.0	2	2.4
C	46		42		88	
absent	45	97.8	42	100.0	87	98.9
interproximal mesial	1	2.2	0	0.0	1	1.1
I2	30		30		60	
present	0	0.0	0	0.0	0	0.0
I1	21		25		46	
present	0	0.0	0	0.0	0	0.0
TOTAL MANDIBULAR	311		323		634	
absent	303	97.4	311	96.3	614	96.8
occlusal	2	0.6	3	0.9	5	0.8
interproximal	4	1.3	4	1.2	8	1.3
buccal crown	1	0.3	2	0.6	3	0.5
huge	1	0.3	3	0.9	4	0.6
MAX. AND MAND.						
Molars	238		264		502	
absent	229	96.2	248	93.9	477	95.0
occlusal fissure	2	0.8	4	1.5	6	1.2
occlusal gross	1	0.4	0	0.0	1	0.2
interproximal distal	2	0.8	3	1.1	5	1.0
buccal crown	1	0.4	2	0.8	3	0.6
lingual crown	0	0.0	1	0.4	1	0.2
huge caries	3	1.3	6	2.3	9	1.8

Table B.35 (cont'd). Prevalence of Caries in Adult (>15 years) Permanent Teeth

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
Premolars	177		185		362	
absent	174	98.3	182	98.4	356	98.3
interproximal (all)	3	1.7	3	1.6	6	1.7
Canines	82		77		159	
absent	81	98.8	77	100.0	158	99.4
interproximal mesial	1	1.2	0	0.0	1	0.6
Incisors	100		110		210	
absent	99	99.0	109	99.1	208	99.0
occlusal gross	0	0.0	1	0.9	1	0.5
interproximal distal	1	1.0	0	0.0	1	0.5
OVERALL	597		636		1233	
absent	583	97.7	616	96.9	1199	97.2
occlusal (all)	3	0.5	5	0.8	8	0.6
interproximal (all)	7	1.2	6	0.9	13	1.1
crown (all)	1	0.2	3	0.5	4	0.3
huge	3	0.5	6	0.9	9	0.7

Note: M=molar, P=premolar, C=canine, I=incisor, CEJ=cemento-enamel junction.
Includes 80 individuals: 38 males, 42 females; 76 adults (>20 years) 4 adolescents (15-20 years).

Table B.36. Prevalence of Alveolar Resorption in Non Nok Tha Adult Permanent Dentitions

Sockets Observed Sockets Affected	Male		Female		Total	
	A	%	A	%	A	%
MAXILLARY						
M3	27		21		48	
absent	14	51.9	14	66.7	28	58.3
slight	9	33.3	6	28.6	15	31.3
moderate	3	11.1	1	4.8	4	8.3
marked	1	3.7	0	0.0	1	2.1
M2	36		31		67	
absent	17	47.2	18	58.1	35	52.2
slight	14	38.9	12	38.7	26	38.8
moderate	3	8.3	1	3.2	4	6.0
marked	2	5.6	0	0.0	2	3.0
M1	36		31		67	
absent	16	44.4	19	61.3	35	52.2
slight	13	36.1	11	35.5	24	35.8
moderate	7	19.4	1	3.2	8	11.9
P4	42		38		80	
absent	14	33.3	23	60.5	37	46.3
slight	16	38.1	12	31.6	28	35.0
moderate	12	28.6	3	7.9	15	18.8
P3	40		33		73	
absent	14	35.0	19	57.6	33	45.2
slight	18	45.0	13	39.4	31	42.5
moderate	8	20.0	1	3.0	9	12.3
C	35		23		58	
absent	16	45.7	18	78.3	34	58.6
slight	13	37.1	5	21.7	18	31.0
moderate	6	17.1	0	0.0	6	10.3

Table B.36 (cont'd.). Prevalence of Alveolar Resorption in Non Nok Tha Adult Permanent Dentitions

Sockets Observed Sockets Affected	Male		Female		Total	
	A	%	A	%	A	%
I2	22		19		41	
absent	13	59.1	18	94.7	31	75.6
slight	7	31.8	1	5.3	8	19.5
moderate	2	9.1	0	0.0	2	4.9
I1	18		16		34	
absent	11	61.1	15	93.8	26	76.5
slight	6	33.3	1	6.2	7	20.6
moderate	1	5.6	0	0.0	1	2.9
TOTAL MAXILLARY	256		212		468	
absent	115	44.9	144	67.9	259	55.3
slight	96	37.5	61	28.8	157	33.5
moderate	42	16.4	7	3.3	49	10.5
marked	3	1.2	0	0.0	3	0.6
MANDIBULAR						
M3	39		33		72	
absent	26	66.7	28	84.8	54	75.0
slight	9	23.1	4	12.1	13	18.1
moderate	2	5.1	0	0.0	2	2.8
marked	2	5.1	1	3.0	3	4.2
M2	44		46		90	
absent	27	61.4	34	73.9	61	67.8
slight	10	22.7	9	19.6	19	21.1
moderate	3	6.8	1	2.2	4	4.4
marked	4	9.1	2	4.3	6	6.7
M1	41		43		84	
absent	28	68.3	28	65.1	56	66.7
slight	7	17.1	10	23.3	17	20.2
moderate	2	4.9	3	7.0	5	6.0
marked	4	9.8	2	4.7	6	7.1

Table B.36 (cont'd.). Prevalence of Alveolar Resorption in Non Nok Tha Adult Permanent Dentitions

Sockets Observed Sockets Affected	Male		Female		Total	
	A	%	A	%	A	%
P4	43		39		82	
absent	22	51.2	29	74.4	51	62.2
slight	15	34.9	8	20.5	23	28.0
moderate	4	9.3	1	2.6	5	6.1
marked	2	4.7	1	2.6	3	3.7
P3	46		32		78	
absent	24	52.2	21	65.6	45	57.7
slight	18	39.1	9	28.1	27	34.6
moderate	3	6.5	2	6.3	5	6.4
marked	1	2.2	0	0.0	1	1.3
C	35		26		61	
absent	21	60.0	18	69.2	39	63.9
slight	14	40.0	7	26.9	21	34.4
moderate	0	0.0	1	3.8	1	1.6
I2	34		15		49	
absent	24	70.6	12	80.0	36	73.5
slight	10	29.4	3	20.0	13	26.5
I1	28		10		38	
absent	19	67.9	8	80.0	27	71.1
slight	9	32.1	2	20.0	11	28.9
TOTAL MAND.	310		244		554	
absent	191	61.6	178	73.0	369	66.7
slight	92	29.7	52	21.3	144	26.0
moderate	14	4.5	8	3.3	22	4.0
marked	13	4.2	6	2.5	19	3.4

Table B.36 (cont'd.). Prevalence of Alveolar Resorption in Non Nok Tha Adult Permanent Dentitions

Sockets Observed Sockets Affected	Male		Female		Total	
	A	%	A	%	A	%
COMBINED JAWS						
Molars	223		205		428	
absent	128	57.4	141	68.8	269	62.9
slight	62	27.8	52	25.4	114	26.6
moderate	20	9.0	7	3.4	27	6.3
marked	13	5.8	5	2.4	18	4.2
Premolars	171		142		313	
absent	74	43.3	92	64.8	166	53.0
slight	67	39.2	42	29.6	109	34.8
moderate	27	15.8	7	4.9	34	10.9
marked	3	1.8	1	0.7	4	1.3
Canines	70		49		119	
absent	37	52.9	36	73.5	73	61.3
slight	27	38.6	12	24.5	39	32.8
moderate	6	8.6	1	2.0	7	5.9
Incisors	102		60		162	
absent	67	65.7	53	88.3	120	74.1
slight	32	31.4	7	11.7	39	24.1
moderate	33	2.9	0	0.0	3	1.9
OVERALL	566		456		1022	
absent	306	54.1	322	70.6	628	61.4
slight	188	33.2	113	24.8	301	29.5
moderate	56	9.9	15	3.3	71	6.9
marked	16	2.8	6	1.3	22	2.2

Note: 74 individuals are represented: 37 males, 37 females; 72 adults, 2 adolescents.

Table B.37. Prevalence of Calculus Deposits in Adult Permanent Teeth from Non Nok Tha

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
MAXILLARY						
M3	18		17		35	
absent	3	16.7	3	17.6	6	17.1
slight	11	61.1	14	82.4	25	71.4
moderate	4	22.2	0	0.0	4	11.4
M2	38		35		73	
absent	2	5.3	9	25.7	11	15.1
slight	16	42.1	20	57.1	36	49.3
moderate	20	52.6	6	17.1	26	35.6
M1	38		38		76	
absent	2	5.3	10	26.3	12	15.8
slight	17	44.7	20	55.3	35	50.0
moderate	19	50.0	7	18.4	26	34.2
P4	37		34		71	
absent	4	10.8	8	23.5	12	16.9
slight	21	56.8	20	58.8	41	57.7
moderate	12	32.4	6	17.6	18	25.4
P3	35		33		68	
absent	5	14.3	10	30.3	15	22.1
slight	20	57.1	19	57.6	39	57.4
moderate	10	28.6	4	12.1	14	20.6
C	30		24		54	
absent	4	13.3	11	45.8	15	27.8
slight	20	66.7	13	54.2	33	61.1
moderate	6	20.0	0	0.0	6	11.1
I2	21		14		35	
absent	1	4.8	8	57.1	9	25.7
slight	15	71.4	6	42.9	21	60.0
moderate	5	23.8	0	0.0	5	14.3

Table B.37 (cont'd). Prevalence of Calculus Deposits in Adult Permanent Teeth from Non Nok Tha

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
I1	22		16		38	
absent	1	4.6	8	50.0	9	23.7
slight	16	72.7	8	50.0	24	63.2
moderate	5	22.7	0	0.0	5	13.2
TOTAL MAXILLARY	239		211		450	
absent	22	9.2	67	31.8	89	19.8
slight	136	56.9	121	57.3	257	57.1
moderate	81	33.9	23	10.9	104	23.1
MANDIBULAR						
M3	38		22		60	
absent	6	15.8	7	31.8	13	21.7
slight	15	39.5	12	54.5	27	45.0
moderate	16	42.1	3	13.6	19	31.7
marked	1	2.6	0	0.0	1	1.7
M2	42		33		75	
absent	4	9.5	4	12.1	8	10.7
slight	17	40.5	22	66.7	39	52.0
moderate	20	47.6	7	21.2	27	36.0
marked	1	2.4	0	0.0	1	1.3
M1	39		36		75	
absent	4	10.3	4	11.1	8	10.7
slight	16	41.0	26	72.2	42	56.0
moderate	19	48.7	6	16.7	25	33.3
P4	40		33		73	
absent	5	12.5	4	12.1	9	12.3
slight	19	47.5	20	60.6	39	53.4
moderate	16	40.0	9	27.3	25	34.2

Table B.37 (cont'd). Prevalence of Calculus Deposits in Adult Permanent Teeth from Non Nok Tha

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
P3	39		24		63	
absent	5	12.8	5	20.8	10	15.9
slight	15	38.5	14	58.3	29	46.0
moderate	18	46.2	5	20.8	23	36.5
marked	1	2.6	0	0.0	1	1.6
C	42		25		67	
absent	4	9.5	4	16.0	8	11.9
slight	13	31.0	17	68.0	30	44.8
moderate	23	54.8	4	16.0	27	40.3
marked	2	4.8	0	0.0	2	3.0
I2	27		20		47	
absent	1	3.7	3	15.0	4	8.5
slight	11	40.7	13	65.0	24	51.1
moderate	13	48.1	3	15.0	16	34.0
marked	2	7.4	1	5.0	3	6.4
I1	20		15		35	
absent	1	5.0	2	13.3	3	8.6
slight	9	45.0	9	60.0	18	51.4
moderate	8	40.0	3	20.0	11	31.4
marked	2	10.0	1	6.7	3	8.6
TOTAL MAND.	287		208		495	
absent	30	10.5	33	15.8	63	12.7
slight	115	40.1	133	63.9	248	50.1
moderate	133	46.3	40	19.2	173	35.0
marked	9	3.1	2	1.0	11	2.2

Table B.37 (cont'd). Prevalence of Calculus Deposits in Adult Permanent Teeth from Non Nok Tha

Tooth	Male (N)		Female (N)		Total (N)	
	n	%	n	%	n	%
COMBINED JAWS						
Molars	213		181		394	
absent	21	9.9	37	20.4	58	14.7
slight	92	43.2	115	63.5	207	52.5
moderate	98	46.0	29	16.0	127	32.2
marked	2	0.9	0	0.0	2	0.5
Premolars	151		124		275	
absent	19	12.6	27	21.8	46	16.7
slight	75	49.7	73	58.9	148	53.8
moderate	56	37.1	24	19.4	80	29.1
marked	1	0.7	0	0.0	1	0.4
Canines	72		49		121	
absent	8	11.1	15	30.6	23	19.0
slight	33	45.8	30	61.2	63	52.1
moderate	29	40.3	4	8.2	33	27.3
marked	2	2.8	0	0.0	2	1.7
Incisors	90		65		155	
absent	4	4.4	21	32.3	25	16.1
slight	51	56.7	36	555.4	87	56.1
moderate	31	34.4	6	9.2	37	23.9
marked	4	4.4	2	3.1	6	3.9
OVERALL	526		419		945	
absent	52	9.9	100	23.9	152	16.1
slight	251	47.7	254	60.6	505	53.4
moderate	214	40.7	63	15.0	277	29.3
marked	9	1.7	2	0.5	11	1.2

Note: Includes 66 individuals: 35 males, 31 females; 64 adults (> 20 years), 2 adolescents.

Table B.38. Prevalence of Attrition in Adult (>15 years) Permanent Dentitions from Non Nok Tha

Jaw/Tooth Degree of Wear	Male (O)		Female (O)		Total (O)	
	A	%	A	%	A	%
Maxillary						
M3	23		23		46	
none	4	17.4	8	34.8	12	26.1
enamel	19	82.6	14	60.9	33	71.7
dentin	0	0.0	1	4.3	1	2.2
M2	44		44		88	
none	1	2.3	0	0.0	1	1.1
enamel	31	70.5	33	75.0	64	72.7
dentin	11	25.0	11	25.0	22	25.0
pulp	1	2.3	0	0.0	1	1.1
M1	44		52		96	
none	1	2.3	0	0.0	1	1.0
enamel	15	34.1	20	38.5	35	36.5
dentin	26	59.1	29	55.8	55	57.3
pulp	2	4.5	3	5.8	5	5.2
P4	45		50		95	
enamel	27	60.0	31	62.0	58	61.1
dentin	15	33.3	17	34.0	32	33.7
pulp	2	4.4	2	4.0	4	4.2
roots	1	2.2	0	0.0	1	1.1
P3	46		44		90	
enamel	24	52.2	29	65.9	53	58.9
dentin	15	32.6	13	29.5	28	31.1
pulp	4	8.7	2	4.5	6	6.7
roots	3	6.5	0	0.0	3	3.3

Table B.38 (cont'd). Prevalence of Attrition in Adult Permanent Dentitions from Non Nok Tha

Jaw/Tooth Degree of Wear	Male (O)		Female (O)		Total (O)	
	A	%	A	%	A	%
C	36		35		71	
enamel	11	30.6	15	42.9	26	36.6
dentin	21	58.3	18	51.4	39	54.9
pulp	4	11.1	1	2.9	5	7.0
roots	0	0.0	1	2.9	1	1.4
I2	25		26		51	
enamel	6	24.0	9	34.6	15	29.4
dentin	18	72.0	16	61.5	34	66.7
pulp	1	4.0	0	0.0	1	2.0
roots	0	0.0	1	3.8	1	2.0
I1	24		26		50	
enamel	1	4.2	3	11.5	4	8.0
dentin	22	91.7	21	80.8	43	86.0
pulp	1	4.2	2	7.7	3	6.0
Total Maxillary	287		300		587	
none	6	2.1	8	2.7	14	2.4
enamel	134	46.7	154	51.3	288	49.1
dentin	128	44.6	126	42.0	254	43.3
pulp	15	5.2	10	3.3	25	4.3
roots	4	1.4	2	0.7	6	1.0
Mandibular						
M3	36		36		72	
none	4	11.1	4	11.1	8	11.1
enamel	26	72.2	27	75.0	53	73.6
dentin	5	13.9	5	13.9	10	13.9
pulp	1	2.8	0	0.0	1	1.4

Table B.38 (cont'd). Prevalence of Attrition in Adult Permanent Dentitions from Non Nok Tha

Jaw/Tooth Degree of Wear	Male (O)		Female (O)		Total (O)	
	A	%	A	%	A	%
M2	47		46		93	
enamel	26	55.3	27	58.7	53	57.0
dentin	19	40.4	17	37.0	36	38.7
pulp	2	4.3	2	4.3	4	4.3
M1	39		49		88	
enamel	4	10.3	10	20.4	14	15.9
dentin	34	87.2	34	69.4	68	77.3
pulp	1	2.6	5	10.2	6	6.8
P4	42		43		85	
enamel	29	69.0	28	65.1	57	67.1
dentin	9	21.4	15	34.9	24	28.2
pulp	3	7.1	0	0.0	3	3.5
roots	1	2.4	0	0.0	1	1.2
P3	44		38		82	
enamel	22	50.0	26	68.4	48	58.5
dentin	15	34.1	9	23.7	24	29.3
pulp	4	9.1	3	7.9	7	8.5
roots	3	6.8	0	0.0	3	3.7
C	45		40		85	
enamel	16	35.6	16	40.0	32	37.6
dentin	23	51.1	22	55.0	45	52.9
pulp	5	11.1	2	5.0	7	8.2
roots	1	2.2	0	0.0	1	1.2
I2	30		31		61	
enamel	4	13.3	8	25.8	12	19.7
dentin	21	70.0	21	67.7	42	68.9
pulp	4	13.3	0	0.0	4	6.6
roots	1	3.3	2	6.5	3	4.9

Table B.38 (cont'd). Prevalence of Attrition in Adult Permanent Dentitions from Non Nok Tha

Jaw/Tooth Degree of Wear	Male (O)		Female (O)		Total (O)	
	A	%	A	%	A	%
I1	21		25		46	
enamel	1	4.8	0	0.0	1	2.2
dentin	17	81.0	23	92.0	40	87.0
pulp	3	14.3	0	0.0	3	6.5
roots	0	0.0	2	8.0	2	4.3
Total Mandibular	304		308		612	
none	4	1.3	4	1.3	8	1.3
enamel	128	42.1	142	46.1	270	44.1
dentin	143	47.0	146	47.4	289	47.2
pulp	23	7.6	12	3.9	35	5.7
roots	6	2.0	4	1.3	10	1.6
Combined Jaws						
Molars	233		250		483	
none	10	4.3	12	4.8	22	4.6
enamel	121	51.9	131	52.4	252	52.2
dentin	95	40.8	97	38.8	192	39.8
pulp	7	3.0	10	4.0	17	3.5
Premolars	177		175		352	
enamel	102	57.6	114	65.1	216	61.4
dentin	54	30.5	54	30.9	108	30.7
pulp	13	7.3	7	4.0	20	5.7
roots	8	4.5	0	0.0	8	2.3
Canines	81		75		156	
enamel	27	33.3	31	41.3	58	37.2
dentin	44	54.3	40	53.3	84	53.8
pulp	9	11.1	3	4.0	12	7.7
roots	1	1.2	1	1.3	2	1.3

Table B.38 (cont'd). Prevalence of Attrition in Adult Permanent Dentitions from Non Nok Tha

Jaw/Tooth Degree of Wear	Male (O)		Female (O)		Total (O)	
	A	%	A	%	A	%
Incisors	100		108		208	
enamel	12	12.0	20	18.5	32	15.4
dentin	78	78.0	81	75.0	159	76.4
pulp	9	9.0	2	1.9	11	5.3
roots	1	1.0	5	4.6	6	2.9
Overall	591		608		1199	
none	10	1.7	12	2.0	22	1.8
enamel	262	44.3	296	48.7	558	46.5
dentin	271	45.9	272	44.7	543	45.3
pulp	38	6.4	22	3.6	60	5.0
roots	10	1.7	6	1.0	16	1.3

Note: Representing 80 individuals: 39 males, 41 females.

Table B.39. Appendicular Osteoarthritis in Non Nok Tha Adults

Articular Surface Change Degree		Male				Female				Total			
		Right		Left		Right		Left		Right		Left	
		A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
SHOULDER	none	68/95	71.6	59/79	74.7	53/63	84.1	53/62	85.5	121/158	76.6	112/141	79.4
porosis	1	3/95	3.2	5/79	6.3	3/63	4.8	2/62	3.2	6/158	3.8	7/141	5.0
	2	0/95	0.0	0/79	0.0	0/63	0.0	1/62	1.6	0/158	0.0	1/141	0.7
lipping	1	21/95	22.1	13/79	16.5	6/63	9.5	6/62	9.7	27/158	17.1	19/141	13.5
	2	1/95	1.1	0/79	0.0	1/63	1.6	0/62	0.0	2/158	1.3	0/141	0.0
lipping/porosis	1	1/95	1.1	2/79	2.5	0/63	0.0	0/62	0.0	1/158	0.6	2/141	1.4
	2	1/95	1.1	0/79	0.0	0/63	0.0	0/62	0.0	1/158	0.6	0/141	0.0
ELBOW	none	64/120	53.3	70/105	66.7	64/99	64.6	76/111	68.5	128/219	58.4	146/216	67.6
porosis	1	0/120	0.0	1/105	1.0	0/99	0.0	0/111	0.0	0/219	0.0	1/216	0.5
lipping	1	53/120	44.2	32/105	30.5	34/99	34.3	33/111	29.7	87/219	39.7	65/216	30.1
	2	3/120	2.5	2/105	1.9	1/99	1.0	2/111	1.8	4/219	1.8	4/216	1.9
WRIST	none	43/67	64.2	46/64	71.9	27/46	58.7	32/44	72.7	70/113	61.9	78/108	72.2
lipping	1	22/67	32.8	16/64	25.0	19/46	41.3	11/44	25.0	41/113	36.3	27/108	25.0
	2	2/67	3.0	2/64	3.1	0/46	0.0	1/44	2.3	2/113	1.8	3/108	2.8
HAND	none	231/315	73.3	321/402	79.9	228/285	80.0	290/334	86.8	459/600	76.5	611/736	83.0
porosis	1	1/315	0.3	1/402	0.2	0/285	0.0	0/334	0.0	1/600	0.2	1/736	0.1
lipping	1	83/315	26.3	80/402	19.9	57/285	20.0	44/334	13.2	140/600	23.3	124/736	16.8

Table B.39 (cont'd). Appendicular Osteoarthritis in Non Nok Tha Adults

Articular Surface Change	Degree	Male				Female				Total			
		Right		Left		Right		Left		Right		Left	
		A/O	%	A/O	%	A/O	%	A/O	%	A/O	%	A/O	%
PELVIS	none	39/71	54.9	42/73	57.5	46/73	63.0	46/78	59.0	85/144	59.0	88/151	58.3
porosis	1	0/71	0.0	0/73	0.0	0/73	0.0	1/78	1.3	0/144	0.0	1/151	0.7
lipping	1	30/71	42.3	31/73	42.5	23/73	31.5	28/78	35.9	53/144	36.8	59/151	39.1
	2	2/71	2.8	0/73	0.0	4/73	5.5	3/78	3.8	6/144	4.2	3/151	2.0
KNEE	none	91/134	67.9	104/142	73.2	76/106	71.7	85/106	80.2	167/240	69.6	189/248	76.2
porosis	1	1/134	0.7	0/142	0.0	0/106	0.0	0/106	0.0	1/240	0.4	0/248	0.0
	2	0/134	0.0	0/142	0.0	1/106	0.9	0/106	0.0	1/240	0.4	0/248	0.0
lipping	1	39/134	29.1	35/142	24.6	28/106	26.4	19/106	17.9	67/240	27.9	54/248	21.8
	2	3/134	2.2	3/142	2.1	1/106	0.9	2/106	1.9	4/240	1.7	5/248	2.0
ANKLE	none	22/65	33.8	27/66	40.9	35/70	50.0	38/57	66.7	57/135	42.2	65/123	52.8
lipping	1	43/65	66.2	38/66	57.6	35/70	50.0	19/57	33.3	78/135	57.8	57/123	46.3
	2	0/65	0.0	1/66	1.5	0/70	0.0	0/57	0.0	0/135	0.0	1/123	0.8
FOOT	none	240/420	57.1	231/381	60.6	362/481	75.3	313/426	73.5	602/901	66.8	544/807	67.4
porosis	1	0/420	0.0	1/381	0.3	0/481	0.0	0/426	0.0	0/901	0.0	1/807	0.1
lipping	1	168/420	40.0	144/381	37.8	115/481	23.9	102/426	23.9	283/901	31.4	246/807	30.5
	2	9/420	2.1	2/381	0.5	2/481	0.4	10/426	2.3	11/901	1.2	12/807	1.5
	3	3/420	0.7	3/381	0.8	2/481	0.4	0/426	0.0	5/901	0.6	3/807	0.4
lipping&porosis	1	0/420	0.0	0/381	0.0	0/481	0.0	1/426	0.2	0/901	0.0	1/807	0.1

Representing 106 individuals: 52 males, 54 females. A=affected, O=observed.

Table B.40. Cervical Vertebral Osteoarthritis in Non Nok Tha Adults

Cervical Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
CERVICAL FACETS							
C2 - C3	none	44/61	72.1	28/36	77.8	72/97	74.2
lipping	1	17/61	27.9	8/36	22.2	25/97	25.8
C3 - C4	none	47/67	70.1	35/41	85.4	82/108	75.9
lipping	1	20/67	29.9	6/41	14.6	26/108	24.1
C4 - C5	none	49/67	73.1	33/42	78.6	82/109	75.2
lipping	1	18/67	26.9	9/42	21.4	27/109	24.8
C5-C6	none	42/65	64.6	35/39	89.7	77/104	74.0
lipping	1	22/65	33.8	4/39	10.3	26/104	25.0
porosis	1	1/65	1.5	0/39	0.0	1/104	1.0
C6 - C7	none	38/58	65.5	40/44	90.9	78/102	76.5
lipping	1	20/58	34.5	4/44	9.1	24/102	23.5
C7 - T1	none	38/68	55.9	38/47	80.9	76/115	66.1
lipping	1	28/68	41.2	9/47	19.1	37/115	32.2
	2	2/68	2.9	0/47	0.0	2/115	1.7
TOTAL	none	258/386	66.8	209/249	83.9	467/635	73.5
lipping	1	125/386	32.4	40/249	16.1	165/635	26.0
	2	2/386	0.5	0/249	0.0	2/635	0.3
porosis	1	1/386	0.3	0/249	0.0	1/635	0.2
CERVICAL BODIES							
C2-C3	none	34/39	87.2	22/22	100.0	56/61	91.8
lipping	1	3/39	7.7	0/22	0.0	3/61	4.9
porosis	1	1/39	2.6	0/22	0.0	1/61	1.6
lipping&porosis	1	1/39	2.6	0/22	0.0	1/61	1.6
C3-C4	none	33/41	80.5	21/21	100.0	54/62	87.1
lipping	1	2/41	4.9	0/21	0.0	2/62	3.2
porosis	1	6/41	14.6	0/21	0.0	6/62	9.7

Table B.40 (cont'd). Cervical Vertebral Osteoarthritis in Non Nok Tha Adults

Cervical Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
C4- C5	none	34/41	82.9	18/21	85.7	52/62	83.9
lipping	1	1/41	2.4	3/21	14.3	4/62	6.5
	2	2/41	4.9	0/21	0.0	2/62	3.2
porosis	1	1/41	2.4	0/21	0.0	1/62	1.6
lipping&porosis	1	3/41	7.3	0/21	0.0	3/62	4.8
C5-C6	none	30/37	81.1	22/24	91.7	52/61	85.3
lipping	1	4/37	10.8	2/24	8.3	6/51	9.8
porosis	1	1/37	2.7	0/24	0.0	1/51	1.6
lipping&porosis	2	1/37	2.7	0/24	0.0	1/51	1.6
	3	1/37	2.7	0/24	0.0	1/51	1.6
C6-C7	none	27/34	79.4	20/22	90.9	47/56	83.9
lipping	1	2/34	5.9	0/22	0.0	2/56	3.6
	2	2/34	5.9	1/22	4.5	3/56	5.4
porosis	1	3/34	8.8	1/22	4.5	4/56	7.1
C7 - T1	none	25/29	86.2	17/21	81.0	42/50	84.0
lipping	1	3/29	10.3	1/21	4.8	4/50	8.0
porosis	1	0/29	0.0	3/21	14.3	3/50	6.0
lipping&porosis	2	1/29	3.4	0/21	0.0	1/50	2.0
TOTAL	none	183/221	82.8	120/131	91.6	303/352	86.1
lipping	1	15/221	6.8	6/131	4.6	21/352	6.0
	2	4/221	1.8	1/131	0.8	5/352	1.4
porosis	1	12/221	5.4	4/131	3.1	16/352	4.5
lipping&porosis	1	4/221	1.8	0/131	0.0	4/352	1.1
	2	2/221	0.9	0/131	0.0	2/352	0.6
	3	1/221	0.5	0/131	0.0	1/352	0.3

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 62 individuals: 32 males, 30 females. Each level includes the bilateral inferior facets of the upper vertebra and the bilateral superior facets of the next lower vertebra (i.e. possible 4 observations). Each level in the vertebral body osteoarthritis includes the inferior end-plate and the superior end-plate (i.e. two observations possible).

Table B.41. Thoracic Vertebral Osteoarthritis in Non Nok Tha Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
THORACIC FACETS							
T1-T2	none	33/72	45.8	33/43	76.7	66/115	57.4
lipping	1	35/72	48.6	10/43	23.3	45/115	39.1
	2	4/72	5.6	0/43	0.0	4/115	3.5
T2 - T3	none	25/56	44.6	36/42	85.7	61/98	62.2
lipping	1	29/56	51.8	6/42	14.3	35/98	35.7
	2	2/56	3.6	0/42	0.0	2/98	2.0
T3-T4	none	35/63	55.6	19/30	63.3	54/93	58.1
lipping	1	27/63	42.9	10/30	33.3	37/93	39.8
	2	1/63	1.6	1/30	3.3	2/93	2.2
T4 -T5	none	37/69	53.6	31/50	62.0	68/119	57.1
lipping	1	30/69	43.4	18/50	36.0	48/119	40.3
	2	0/69	0.0	1/50	2.0	1/119	0.8
lipping&porosis	1	2/69	2.9	0/50	0.0	2/119	1.7
T5-T6	none	39/68	57.4	29/48	60.4	68/116	58.6
lipping	1	29/68	42.6	19/48	39.6	48/116	41.4
T6 -T7	none	37/69	53.6	34/49	69.4	71/118	60.2
lipping	1	31/69	44.9	15/49	30.6	46/118	39.0
	2	1/69	1.4	0/49	0.0	1/118	0.8
T7 - T8	none	41/75	54.7	35/48	72.9	76/123	61.8
lipping	1	33/75	44.0	13/48	27.1	46/123	37.4
porosis	1	1/75	1.3	0/48	0.0	1/123	0.8
T8 - T9	none	32/68	47.1	32/41	78.0	64/109	58.7
lipping	1	32/68	47.1	9/41	22.0	41/109	37.6
	2	3/68	4.4	0/41	0.0	3/109	2.8
lipping&porosis	2	1/68	1.5	0/41	0.0	1/109	0.9
T9 - T10	none	34/69	49.3	27/48	56.3	61/117	52.1
lipping	1	34/69	49.3	20/48	41.7	54/117	46.2
	3	1/69	1.4	0/48	0.0	1/117	0.9
lipping&porosis	1	0/69	0.0	1/48	2.1	1/117	0.9

Table B.41 (cont'd). Thoracic Vertebral Osteoarthritis in Non Nok Tha Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
T10 - T11	none	22/58	37.9	22/48	45.8	44/106	41.5
lipping	1	29/58	50.0	26/48	54.2	55/106	51.9
	2	4/58	6.9	0/48	0.0	4/106	3.8
lipping&porosis	1	3/58	5.2	0/48	0.0	3/106	2.8
T11 - T12	none	23/46	50.0	25/46	54.3	48/92	52.2
lipping	1	18/46	39.1	21/46	45.7	39/92	42.4
porosis	1	1/46	2.2	0/46	0.0	1/92	1.1
lipping&porosis	1	2/46	4.3	0/46	0.0	2/92	2.2
	2	2/46	4.3	0/46	0.0	2/92	2.2
TOTAL	none	358/713	50.2	323/493	65.5	681/1206	56.5
lipping	1	327/713	45.9	167/493	33.9	494/1206	41.0
	2	14/713	2.0	2/493	0.4	16/1206	1.3
	3	1/713	0.1	0/493	0.0	1/1206	0.1
porosis	1	3/713	0.4	1/493	0.2	4/1206	0.3
lipping&porosis	1	7/713	1.0	0/493	0.0	7/1206	0.6
	2	3/713	0.4	0/493	0.0	3/1206	0.2
THORACIC BODIES							
T1 - T2	none	25/27	92.6	20/25	80.0	45/52	86.5
lipping	1	1/27	3.7	0/25	0.0	1/52	1.9
porosis	1	1/27	3.7	5/25	20.0	6/52	11.5
T2 - T3	none	26/31	83.9	21/24	87.5	47/55	85.5
lipping	1	1/31	3.2	0/24	0.0	1/55	1.8
porosis	1	4/31	12.9	2/24	8.3	6/55	10.9
lipping&porosis	1	0/31	0.0	1/24	4.2	1/55	1.8
T3-T4	none	28/37	75.7	16/20	80.0	44/57	77.2
lipping	1	6/37	16.2	2/20	10.0	8/57	14.0
porosis	1	3/37	8.1	2/20	10.0	5/57	8.8
T4- T5	none	24/36	66.7	18/23	78.3	42/59	71.2
lipping	1	9/36	25.0	2/23	8.7	11/59	18.6
porosis	1	2/36	5.6	2/23	8.7	4/59	6.8
lipping&porosis	1	1/36	2.8	1/23	4.3	2/59	3.4

Table B.41 (cont'd). Thoracic Vertebral Osteoarthritis in Non Nok Tha Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
T5-T6	none	30/39	76.9	20/22	90.9	50/61	82.0
lipping	1	4/39	10.3	1/22	4.5	5/61	8.2
porosis	1	3/39	7.7	1/22	4.5	4/61	6.6
lipping&porosis	1	2/39	5.1	0/22	0.0	2/61	3.3
T6-T7	none	29/36	80.6	20/22	90.9	49/58	84.5
lipping	1	3/36	8.3	1/22	4.5	4/58	6.9
porosis	1	3/36	8.3	1/22	4.5	4/58	6.9
lipping&porosis	1	1/36	2.8	0/22	0.0	1/58	1.7
T7 - T8	none	33/37	89.2	19/22	86.4	52/59	88.1
lipping	1	2/37	5.4	1/22	4.5	3/59	5.1
porosis	1	2/37	5.4	1/22	4.5	3/59	5.1
lipping&porosis	1	0/37	0.0	1/22	4.5	1/59	1.7
T8 - T9	none	28/35	80.0	19/24	79.2	47/59	79.7
lipping	1	1/35	2.9	2/24	8.3	3/59	5.1
porosis	1	5/35	14.3	3/24	12.5	8/59	13.6
lipping&porosis	1	1/35	2.9	0/24	0.0	1/59	1.7
T9 - T10	none	29/39	74.4	23/29	79.3	52/68	76.5
lipping	1	1/39	2.6	2/29	6.9	3/68	4.4
porosis	1	7/39	17.9	3/29	10.3	10/68	14.7
lipping&porosis	1	2/39	5.1	1/29	3.4	3/68	4.4
T10 - T11	none	27/37	73.0	24/30	80.0	51/67	76.1
lipping	1	4/37	10.8	2/30	6.7	6/67	9.0
porosis	1	4/37	10.8	2/30	6.7	6/67	9.0
lipping&porosis	1	2/37	5.4	2/30	6.7	4/67	6.0
T11 - T12	none	22/31	71.0	22/28	78.6	44/59	74.6
lipping	1	5/31	16.1	0/28	0.0	5/59	8.5
porosis	1	3/31	9.7	6/28	21.4	9/59	15.3
lipping&porosis	1	1/31	3.2	0/28	0.0	1/59	1.7

Table B.41 (cont'd). Thoracic Vertebral Osteoarthritis in Non Nok Tha Adults

Thoracic Vertebral Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
T12 - L1	none	26/29	89.7	25/30	83.3	51/59	86.4
lipping	1	1/29	3.4	0/30	0.0	1/59	1.7
porosis	1	1/29	3.4	4/30	13.3	5/59	8.5
lipping&porosis	1	1/29	3.4	1/30	3.3	2/59	3.4
TOTAL	none	327/414	79.0	247/299	82.6	574/713	80.5
lipping	1	38/414	9.2	13/299	4.3	51/713	7.2
porosis	1	38/414	9.2	32/299	10.7	70/713	9.8
lipping&porosis	1	11/414	2.7	7/299	2.3	18/713	2.5

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 62 individuals: 33 males, 29 females. Each level includes the bilateral inferior facets of the upper vertebra and the bilateral superior facets of the next lower vertebra (i.e. possible 4 observations). Each level in the vertebral body osteoarthritis includes the inferior end-plate and the superior end-plate (i.e. two observations possible).

Table B.42. Rib Facet Osteoarthritis in Non Nok Tha Adults

Rib Number Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
RIB ONE	none	38/51	74.5	35/40	87.5	73/91	80.2
lipping	1	13/51	25.5	5/40	12.5	18/91	19.8
RIB TWO	none	30/51	58.8	13/17	76.5	43/68	63.2
lipping	1	20/51	39.2	4/17	23.5	24/68	35.3
porosis	1	1/51	2.0	0/17	0.0	1/68	1.5
RIB THREE	none	40/62	64.5	23/33	69.7	63/95	66.3
lipping	1	22/62	35.5	10/33	30.3	32/95	33.7
RIB FOUR	none	36/64	56.3	33/45	73.3	69/109	63.3
lipping	1	27/64	42.2	11/45	24.4	38/109	34.9
	2	1/64	1.6	0/45	0.0	1/109	0.9
porosis	1	0/64	0.0	1/45	2.2	1/109	0.9
RIB FIVE	none	50/86	58.1	34/47	72.3	84/133	63.2
lipping	1	34/86	39.5	13/47	27.7	47/133	35.3
	2	1/86	1.2	0/47	0.0	1/133	0.8
porosis	1	1/86	1.2	0/47	0.0	1/133	0.8
RIB SIX	none	40/72	55.6	31/46	67.4	71/118	60.2
lipping	1	30/72	41.7	15/46	32.6	45/118	38.1
	2	2/72	2.8	0/46	0.0	2/118	1.7
RIB SEVEN	none	37/77	48.1	23/36	63.9	60/113	53.1
lipping	1	39/77	50.6	13/36	36.1	52/113	46.0
lipping&porosis	1	1/77	1.3	0/36	0.0	1/113	0.9
RIB EIGHT	none	38/70	54.3	18/24	75.0	56/94	59.6
lipping	1	31/70	44.3	6/24	25.0	37/94	39.4
lipping&porosis	1	1/70	1.4	0/24	0.0	1/94	1.1
RIB NINE	none	39/67	58.2	23/27	85.2	62/94	66.0
lipping	1	25/67	37.3	4/27	14.8	29/94	30.9
	2	1/67	1.5	0/27	0.0	1/94	1.1
porosis	1	1/67	1.5	0/27	0.0	1/94	1.1
lipping&porosis	1	1/67	1.5	0/27	0.0	1/94	1.1
RIB TEN	none	31/59	52.5	13/22	59.1	44/81	54.3
lipping	1	25/59	42.4	9/22	40.9	34/81	42.0
	2	3/59	5.1	0/22	0.0	3/81	3.7

Table B.41 (cont'd). Rib Facet Osteoarthritis in Non Nok Tha Adults

Rib Number Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
RIB ELEVEN	none	23/39	59.0	19/28	67.9	42/67	62.7
lipping	1	14/39	35.9	9/28	32.1	23/67	34.3
lipping&porosis	1	2/39	5.1	0/28	0.0	2/67	3.0
RIB TWELVE	none	10/31	32.3	13/20	65.0	23/51	45.1
lipping	1	21/31	67.7	7/20	35.0	28/51	54.9
TOTAL	none	412/729	56.5	278/385	72.2	690/1114	61.9
lipping	1	301/729	41.3	106/385	27.5	407/1114	36.5
	2	8/729	1.1	0/385	0.0	8/1114	0.7
porosis	1	3/729	0.4	1/385	0.3	4/1114	0.4
lipping&porosis	1	5/729	0.7	0/385	0.0	5/1114	0.4

Note: Includes observations from 66 individuals: 36 males, 30 females. Each rib includes observations of the right and left rib head, right and left rib tubercle, and right and left thoracic facets, giving six possible sites. 1=slight, 2=moderate, A=affected, O=observed.

Table B.43. Lumbar Vertebral Osteoarthritis in Non Nok Tha Adults

Lumbar Articulations Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
LUMBAR FACETS							
T12-L1	none	14/62	22.6	20/47	42.6	34/109	31.2
lipping	1	48/62	77.4	27/47	57.4	75/109	68.8
	2						
L1 - L2	none	19/61	31.1	9/52	17.3	28/113	24.8
lipping	1	39/61	63.9	43/52	82.7	82/113	72.6
	2	2/61	3.3	0/52	0.0	2/113	1.8
porosis	1	1/61	1.6	0/52	0.0	1/113	0.9
L2-L3	none	19/66	28.8	17/56	30.4	36/122	29.5
lipping	1	46/66	69.7	39/56	69.6	85/122	69.7
porosis	1	1/66	1.5	0/56	0.0	1/122	0.8
L3 -L4	none	14/67	20.9	18/62	29.0	32/129	24.8
lipping	1	46/67	68.7	44/62	71.0	90/129	69.8
	2	6/67	9.0	0/62	0.0	6/129	4.7
lipping&porosis	1	1/67	1.5	0/62	0.0	1/129	0.8
L4-L5	none	14/55	25.5	19/58	32.8	33/113	29.2
lipping	1	36/55	65.5	39/58	67.2	75/113	66.4
	2	4/55	7.3	0/58	0.0	4/113	3.5
lipping&porosis	2	1/55	1.8	0/58	0.0	1/113	0.9
L5 -S1	none	13/45	28.9	20/47	42.6	33/92	35.9
lipping	1	31/45	68.9	26/47	55.3	57/92	62.0
	2	1/45	2.2	0/47	0.0	1/92	1.1
	3	0/45	0.0	1/47	2.1	1/92	1.1
TOTAL	none	93/356	26.1	103/322	32.0	196/678	28.9
lipping	1	246/356	69.1	218/322	67.7	464/678	68.4
	2	13/356	3.7	0/322	0.0	13/678	1.9
	3	0/356	0.0	1/322	0.3	1/678	0.1
porosis	1	2/356	0.6	0/322	0.0	2/678	0.3
lipping&porosis	1	1/356	0.3	0/322	0.0	1/678	0.1
	2	1/356	0.3	0/322	0.0	1/678	0.1

Table B.43 (cont'd). Lumbar Vertebral Osteoarthritis in Non Nok Tha Adults

Lumbar Articulations Osteoarthritis LUMBAR BODIES		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
L1 - L2	none	19/29	65.5	22/29	75.9	41/58	70.7
lipping	1	4/29	13.8	2/29	6.9	6/58	10.3
	2	1/29	3.4	0/29	0.0	1/58	1.7
porosis	1	2/29	6.9	4/29	13.8	6/58	10.3
lipping&porosis	1	2/29	6.9	0/29	0.0	2/58	3.4
	2	1/29	3.4	1/29	3.4	2/58	3.4
L2-L3	none	18/30	60.0	22/32	68.8	40/62	64.5
lipping	1	5/30	16.7	1/32	3.1	6/62	9.7
	2	2/30	6.7	0/32	0.0	2/62	3.2
porosis	1	1/30	3.3	7/32	21.9	8/62	12.9
lipping&porosis	1	3/30	10.0	2/32	6.3	5/62	8.1
	2	1/30	3.3	0/32	0.0	1/62	1.6
L3- L4	none	21/32	65.6	21/34	61.8	42/66	63.6
lipping	1	3/32	9.4	2/34	5.9	5/66	7.6
porosis	1	3/32	9.4	8/34	23.5	11/66	16.7
	2	1/32	3.1	0/34	0.0	1/66	1.5
lipping&porosis	1	2/32	6.3	2/34	5.9	4/66	6.1
	2	2/32	6.3	1/34	2.9	3/66	4.5
L4-L5	none	25/36	69.4	21/36	58.3	46/72	63.9
lipping	1	4/36	11.1	3/36	8.3	7/72	9.7
porosis	1	2/36	5.6	6/36	16.7	8/72	11.1
lipping&porosis	1	0/36	0.0	3/36	8.3	3/72	4.2
	2	3/36	8.3	3/36	8.3	6/72	8.3
	3	2/36	5.6	0/36	0.0	2/72	2.8
L5-S1	none	21/32	65.6	24/37	64.9	45/69	65.2
lipping	1	4/32	12.5	1/37	2.7	5/69	7.2
porosis	1	0/32	0.0	6/37	16.2	6/69	8.7
	2	2/32	6.3	1/37	2.7	3/69	4.3
lipping&porosis	1	2/32	6.3	3/37	8.1	5/69	7.2
	2	2/32	6.3	2/37	5.4	4/69	5.8
	3	1/32	3.1	0/37	0.0	1/69	1.4

Table B.43 (cont'd). Lumbar Vertebral Osteoarthritis in Non Nok Tha Adults

Lumbar Articulations Osteoarthritis		Male		Female		Total	
		A/O	%	A/O	%	A/O	%
TOTAL	none	104/159	65.4	110/168	65.5	214/327	65.4
lipping	1	20/159	12.6	9/168	5.4	29/327	8.9
	2	3/159	1.9	0/168	0.0	3/327	0.9
porosis	1	8/159	5.0	31/168	18.5	39/327	11.9
	2	3/159	1.9	1/168	0.6	4/327	1.2
lipping&porosis	1	9/159	5.7	10/168	6.0	19/327	5.8
	2	9/159	5.7	7/168	4.2	16/327	4.9
	3	3/159	1.9	0/168	0.0	3/327	0.9

Note: A=affected, O=observed, 1=slight, 2=moderate, 3=marked. Includes observations from 61 individuals: 30 males, 31 females. Each level includes the bilateral inferior facets of the upper vertebra and the bilateral superior facets of the next lower vertebra (i.e. possible 4 observations). Each level in the vertebral body osteoarthritis includes the inferior end-plate and the superior end-plate (i.e. two observations possible).

Table B.44. Abridged Life Table for Khok Phanom Di

x	n_x	D_x	d_x	l_x	q_x	L_x	m_x	T_x	e^o_x
0-4.9	5	74	48.05	100.0	0.000	379.87	0.1265	1837.7	18.38
5-9.9	5	7	4.55	51.95	0.875	248.38	0.0183	1457.8	28.06
10-14.9	5	5	3.25	47.40	0.0685	228.90	0.0142	1209.4	25.51
15-19.9	5	8	5.19	44.16	0.1176	207.79	0.0250	980.52	22.21
20-24.9	5	8	5.19	38.96	0.1333	181.82	0.0286	772.73	19.83
25-60	35	52	33.77	33.77	1.000	590.91	0.0571	590.91	17.50
Total		154							

Note: After Jackes 1992.
x = Age interval in years
n_x = Width of age interval x
D_x = Actual numbers of observed deaths at age x
d_x = Number of individuals dying at age x, based on a cohort of 100
l_x = Survivorship at age x q_x = Mortality rate or probability of dying at age x
L_x = Number of years lived between age x and $x+1$
m_x = Age specific death rate for age interval x
T_x = Total number of years lived beyond age x
e^o_x = Expectation of life at age interval x (life expectancy)

APPENDIX C: BURIAL DESCRIPTIONS

Key to Summary Burial Descriptions

Burial No.: Individual skeleton number. Letter designations (i.e. "A" or "B") denote additional human remains that were either individuals interred with the primary burial (e.g. infants with adults) or individuals where bones were redeposited and commingled with a subsequent burial.

Archaeological Context: Brief summary of provenience data, portion of the burial recovered by the excavators, as well as *in situ* measurements of individual bones if made. Provenience information:

Period and phase: Assigned by White.
Excavation square: A letter and number designation (e.g. square C6).
Quadrant: The quadrant of the square (e.g. northwest quadrant).
Layer: The excavation layer, specific to the square.
DBDP: Depth Below Datum Plane.
OrientationDirectional orientation of the head of the burial, in degrees. Degrees are as recorded in the field if available. If unavailable or seemingly significantly incorrect, orientation was measured from the field drawings. Designations of E, SE, etc. have been standardized.

Age: The estimated age-at-death with the indicators utilized in parentheses.

Sex: The estimated sex, with the indicators utilized in parentheses. A designation of "?Female" or "?Male" suggests that there were insufficient indicators present to make an absolute determination.

Stature: Estimated stature using Sangvichien et al. (1985, nd) formulae, [bone element], or if stature is calculated from an estimated long bone length Steele (1970) [segment measurement bone element].

Completeness: Description of the skeletal elements that are present, or in the case of more complete burials, skeletal elements that are missing. Presented in two sections: skull and infracranial remains.

Preservation: Description of the preservation of the skeletal elements, including descriptions of weathering loss, coloration, bone density, mineralization, and any reconstruction done.

Additional human remains: Human bone found in the laboratory not part of the primary burial.

Dental pathology: Summary descriptions of tooth loss, caries, abscessing, periodontal disease (rolled rim, calculus, alveolar resorption), hypoplasia, and attrition. Unusual wear patterns, chipping, and staining are also included.

Cranial pathology: Summary descriptions of skull pathology, including abnormalities of the mandible and cranium. Cranial vault thickness measurements made are summarized.

Skeletal pathology: Summary descriptions of pathology of the infracranial skeleton.

Noteworthy features: General observations of the skull or infracranial skeleton, such as occupational facets, robusticity, asymmetry, etc.

Comments: Observations on discrepancies between archaeology and laboratory remains, assigned miscellaneous remains, photograph and radiograph records, summary of estimated age-at-death indicators giving method, phase and age estimate [e.g. Todd X 55+], and any other observations.

BAN CHIANG 1974 (BC) BURIAL DESCRIPTIONS

Burial No.: BC 1

Archaeological context: Late Period X, square C6, northwest quadrant, layer 8 to the surface of layer 9, DBDP 0.62 m (skull), E 85°. Extended, primary burial in fragmentary condition, lying on right side with left hand over pelvis. Left ankle was crossed over right, feet were left in baulk. Pottery sherds beyond skull, along left side and over lower legs. *In situ* measurements: right femur length 385 mm, width 28.5 mm.

Age: Adult (size of long limb bones).

Sex: Female (size of long limb bones).

Stature: Cannot be determined.

Completeness: Fragmentary skull and infracranial skeleton. The cranium is represented by small fragments of the vault only; a portion of the nasal process of the maxilla and the right coronoid process of the mandible. The infracranial remains include fragments of the left humerus and a forearm bone, shafts of the femora, left tibia, and fragments of the left fibula. Long bone fragments of the right tibia and a single hand phalanx are also present.

Preservation: Poor. The cranial fragments could not be reconstructed. The infracranial remains were reconstructed from small fragments. The right tibia was fragmented and could not be reconstructed. No cancellous bone or articular surfaces are preserved. The bone is coarse, light tan, and weathered. Most of the broken edges are stained.

Additional human remains: An adult ?male right tibial fragment. Fresh breakage led to its designation as Burial 51, to the south of BC Burial 1. Thin, light brown-colored subadult cranial vault fragments, including the anterior parietal bones along the sagittal and coronal sutures, and a deciduous right maxillary first molar, all labelled Feature 1.

Dental pathology:

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments:

Burial No.: BC 2

Archaeological context: Middle Period/Late Period, square C4, southeast quadrant, layer 7 to the surface of layer 8, DBDP 1.01 m (tibia), E 110°. Two lower legs protruding from the south baulk overlain by several ceramic vessel fragments.

Age: Young adult (osteoarthritis).

Sex: ?Female (infracranial bone size).

Stature: 149.5 ± 5.67 cms (4' 10¾") [segment left tibia].

Completeness: Fragmentary lower limb bones. Present are fragments of the distal right femoral shaft and condyles, the lateral right patella, the right tibial shaft and plateau fragments, left tibial shaft missing the ends, the right fibular shaft, the proximal half of the left fibular shaft, the right superior talus, and a number of small fragments.

Preservation: Poor. Very fragmentary bone. All remains had to be reconstructed. Very little epiphyseal bone is preserved. The bone is dark brown in color and has a thin layer of preservative applied. The interiors of the tibiae are filled with dark brown earth. Bone texture is coarse, and shiny from the preservative.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: The right tibia has a smooth, cortical lump on the proximal medial anterior crest just below the level of the nutrient foramen. The bone is well healed and there is no indication of malalignment. The right fibular shaft appears thickened and lumpy but cortical bone appears normal. It is difficult to assess these changes because of the application of preservative and preservation problems. Radiograph of the tibia does not demonstrate the thickening.

Noteworthy features:

Comments: Photographs: tibiae, fibulae. Radiographs: bilateral tibiae and fibulae.

Burial No.: BC 3

Archaeological context: Late Period X, square C6, northwest quadrant, layer 8 to the surface of layer 9, DBDP 0.66 m (skull), E 87°. Fragments of a crushed skull, an associated ceramic vessel and possibly animal bones from along the north section.

Age: Adult (infracranial bone size and dental wear).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Infracranial and cranial vault fragments. There are cranial vault fragments and a single petrous portion of the temporal bone, a metacarpal head, a vertebral fragment, and three ?mandibular molars.

Preservation: Poor. Very fragmentary, weathered and worn. The bone had been coated with preservative over dirt. There is some black mottling of the cortex underneath the preservative. Attempts to clean with water resulted in considerable additional deterioration. The tooth roots are weathered away and the enamel has cracked and exfoliated.

Additional human remains: None.

Dental pathology: Dental wear has flattened the cusps on one molar.

Cranial pathology: There is considerable thickening of the vault fragments. The diplöe has an unusual look, very small trabeculae and chaotic organization. The inner and outer tables are very thin. Unable to take measurements as no identifiable landmarks.

Skeletal pathology:

Noteworthy features:

Comments: Appears human, appears adult, appears to be a single person. The field records document a humerus, but no long bones were recovered in the laboratory. Photographs: cranial vault fragments, dental remains.

Burial No.: BC 4

Archaeological context: Middle Period VI?, square C3, southeast quadrant, layer 6 to layer 7, DBDP 1.46 m (skull fragments), SE 133°. Supine, extended, primary burial, with most of the upper body disturbed. Pottery concentrations were found on the right hip and at the right shoulder. *In situ* measurements: left fibula length 298 mm, left femur length 378 mm, left tibia length 308 mm.

Age: 17 - 20 years (epiphyseal fusion and dental wear).

Sex: ?Female (femoral head diameter, long limb bone size).

Stature: 149.2 ± 5.2 cms (4' 11") [left femur].

Completeness: Partial infracranial skeleton and fragmentary skull. The skull includes the left maxillary teeth, the right mandible with teeth *in situ*, nasal processes of the maxilla, left zygoma, right petrous, left temporal and vault bones. The infracranial remains are missing most of the vertebrae, all ribs, the left arm, scapulae, left clavicle, right patella, most of the hands and the foot phalanges.

Preservation: Fair - Poor. The skull is poorly preserved, incomplete and unreconstructible. The vault bones have exfoliated. The mandible is fairly well preserved as are the loose teeth. The infracranial remains were reconstructed and had extensive weathering of the cancellous bone, epiphyses, tali and complete loss of the fibular ends. The bone is light brown in color to tan where there is no preservative. A thin coat of preservative is applied to most bones. The radius is the only intact bone.

Additional human remains: A 5 - 6 lunar months fetal left zygoma (height 15 mm).

Dental pathology: There are large fissure occlusal caries in the mandibular left first molar and the maxillary left first molar. Preservation of calculus is poor but residual deposits on the teeth suggest slight to moderate. Dental wear exposes the dentin in the anterior teeth.

Cranial pathology: The posterior left parietal fragments, including a portion at the lambda, exhibit a healed fine porosis (<0.1 mm) and thickening of the cranial vault. The holes remaining are less than 0.05 mm. The diploë is the thickest portion of the vault bones. The left zygoma may be slightly thickened but without porosis or reactive bone.

Skeletal pathology: None noted.

Noteworthy features: The left distal fibula has several perpendicular cut marks on the anterior surface of the bone. The proximal tibial epiphyses are separated suggesting that there was no fusion or incomplete fusion, but the epiphyseal surfaces are not distinguishable.

Comments: Aging: Pubic symphysis Gilbert ΣI 19.8±2.62; Todd II 20-21; Suchey I 19.4±2.6. Photographs: caries, skull vault. Radiographs: left femur, right radius.

Burial No.: BC 5

Archaeological context: Early Period V/Middle Period VI, square C3, southeast quadrant, layer 7, DBDP 1.51 m (femur), NW 312°. Disturbed, out of articulation remains, probably cut by Burial 4. The mandible was inverted over the proximal femur.

Age: Middle-aged (dental wear).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and incomplete mandible. A nearly complete mandible, but missing the left inferior body, gonial angle, and the right condyle, is present. Infracranial remains include the left humeral shaft, a proximal fragment of the right humeral shaft, a single vertebral facet, a ?right femoral midshaft fragment, left capitate and right scaphoid, trapezium, third metacarpal and several hand phalanges, and a small bag of miscellaneous bone fragments.

Preservation: Fair - Poor. The mandible is fairly well preserved, reconstructed, but the bone is very fragile and flaky. The infracranial remains are brown in color, reconstructed and missing all cancellous bone. Most of the breakage is old but some is newer. There is a thin layer of preservative over most bones. There is dark brown dirt inside the long limb bones.

Additional human remains: None.

Dental pathology: Bilateral supernumerary teeth (duplicate fourth premolars) are present on the lingual sides of the mandibular body and have perforated the alveolus at the fourth premolar/first molar area. Calculus is moderate. Dental wear exposes the dentin on the posterior teeth. Small fissure caries are present in the mandibular right and left third molars and the left second molar.

Cranial pathology:

Skeletal pathology: The femoral shaft fragment has a large protruding ridge of bone which extends obliquely across the anterior midshaft. The ridge substantially increases the anterior-posterior diameter of the shaft. The medullary cavity is intact and there appears to be no anterior or lateral angulation of the distal end of the femur. Differential diagnosis includes a healed fracture of the distal femoral shaft or osteochondroma.

Noteworthy features:

Comments: The jaw appears male and the humerus appears small ?female, but comparison of measurements suggest male sex. Pelvic fragment noted by the excavator was not identified in the laboratory, and a femoral shaft identified as left by the excavator considered ?right in the laboratory. Photographs: mandible, femur. Radiographs: mandible, femur.

Burial No.: BC 6

Archaeological context: Early Period V/Middle Period VI, square C3, northwest quadrant, layer 6, DBDP 1.49 m (femur), SE 145°. Fragmentary, disturbed burial with distal lower limbs in baulk.

Age: Middle-aged (osteoarthritis).

Sex: Male (robusticity of long limb bones).

Stature: 153.3 ± 7.7 cms (5' 0") [segment measurement left femur].

Completeness: Partial lower limb bones. Present are a fragment of the acetabular rim, the left femoral shaft without ends, fragments of the femoral condyles, left patella, a right femoral shaft fragment, left tibial and fibular shafts, distal left fibula, right tibial and fibular shaft fragments, two metatarsal fragments, and a hand phalanx. There is a small bag of miscellaneous long limb bone fragments.

Preservation: Poor. Most of the long limb bone fragments are weathered and stained. The femur is light brown in color and has a thin layer of preservative. The other bone fragments are coarse, weathered, with brown and grey ashy earth adherent. The left fibular shaft was reconstructed. No other reconstruction was possible.

Additional human remains:

Dental pathology:

Cranial pathology:

Skeletal pathology: There is slight lipping and two porotic lesions of the left femoral medial condyle as well as an ossific nodule of the left patella between the medial and lateral facets.

Noteworthy features:

Comments: The femur appears much less robust than the fibula/tibia. Photograph: posterior patella.

Burial No.: BC 7

Archaeological context: Early Period V/Middle Period VI, square C3, northwest quadrant, layer 6, DBDP 1.29 m (skull), SE 145°. The burial is supine, extended, and disturbed with most of the pelvis and the legs in the baulk.

Age: Middle-aged (dental wear and osteoarthritis).

Sex: ?Male (robusticity of the long limb bones).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial remains and fragmentary skull. The skull is represented by fragments of the mandible with all teeth in the alveolus except the central incisors, loose maxillary left canine, second and third molars, and a few parietal bone fragments. The infracranial remains include the left glenoid fossa, left clavicular shaft, left distal humeral fragment, right proximal ulnar fragment, left ulnar distal shaft, lower thoracic and upper lumbar vertebrae, some ribs, and few miscellaneous fragments.

Preservation: Fair - Poor. Reconstruction of all elements was required. The mandible was reconstructed from tiny fragments. The cranium is broken and weathered and there are not enough fragments for complete restoration. The tooth roots are fragile and break off at the crown. The bone color is reddish brown. The infracranial remains are broken with both fresh and weathered ends. Vertebrae are best preserved. Most cancellous bone is lost.

Additional human remains: A single loose deciduous maxillary ?canine with an interproximal caries and wear to the dentin.

Dental pathology: A single interproximal caries of the right maxillary second molar is present. The right maxillary canine has a circular erosion of the enamel on the lingual surface of the crown. There is wear to the dentin in all teeth. Calculus is slight, there is no abscessing. Brownish yellow inclusions are noted in the enamel of some teeth. Slight hypoplasia in the mandibular left canine and third premolar, indicating physiological stress at age two to three and four to five years.

Cranial pathology: There is no apparent cranial vault thickening or porosis in the parietal fragments.

Skeletal pathology: Slight appendicular and vertebral osteoarthritis.

Noteworthy features:

Comments: The vertebrae appear to match. Radiograph: left humerus.

Burial No.: BC 8

Archaeological context: Early Period V/Middle Period VI, square C3, southwest quadrant, layers 6 to 7, DBDP 1.41 m (skull), SE 131°. Supine, extended, primary burial, disturbed at the right face, right shoulder and right lower leg. Pots were broken at the hip and beyond the skull. *In situ* measurements: left tibia length 330 mm, right radius length 220 mm, right ulna length 250 mm. A thin coat of preservative had been applied to the remains, but most bones fragmented upon lifting.

Age: 35 - 40 years (auricular surface and dental wear).

Sex: Female (*os coxae* and cranial morphology).

Stature: 149.9 ± 3.0 cms (4' 10¾) [right femur].

Completeness: Fairly complete infracranial skeleton and skull. The skull is missing the basicranium, the right maxilla, right half of the mandible, and right zygoma. The infracranial skeleton is missing the proximal right humerus, right scapula, right clavicle, most of the left clavicle and scapula, most of the carpals and hand phalanges, the right tibia and fibula, some fragments of the innominates including the pubic rami, most of the cervical vertebrae and thoracic bodies, most ribs, the right foot, left metatarsals, and phalanges.

Preservation: Fair. Old breakage and weathering affects all bones. There is much weathering and loss of cancellous bone, especially in the vertebral bodies, innominates, sacrum and long limb bones. All long limb bones were reconstructed with complete restoration of the left fibula. The cranium could not be fully restored, although individual bones were reconstructed. There is a thin layer of preservative on the mandible, frontal bone and innominates. The bones appear partially mineralized and there are numerous cleaning marks. There is a tan, clay-like dirt adherent to all bone.

Additional human remains: None.

Dental pathology: There is dental wear of the molars which has flattened the cusps and exposed some dentin in the mandibular molars. There is less wear in the maxillary teeth. There is a light brown stain on the mesial surface of the maxillary third molar.

Cranial pathology: Difficult to determine cranial porosity because of exfoliation but does not appear to be present. There is no thickening of the frontal or parietals. Cranial thickness measures 3 to 7 mm.

Skeletal pathology: Slight appendicular and vertebral osteoarthritis. There is a healed fracture of the left twelfth rib body. There is complete *spondylolysis* of the fourth and fifth lumbar vertebrae. There appears to be reactive bone formation at the left auricular surface. Preauricular sulci suggest childbirth.

Noteworthy features:

Comments: Aging: Auricular surface IV 35-39. The distal right humerus was assigned from Bag #1025. Photographs: fourth and fifth lumbar vertebrae, right auricular surface, left twelfth rib, acetabular fragment. Radiographs: right radius, left fibula, twelfth rib.

Burial No.: BC 9

Archaeological context: Early Period V/Middle Period VI*, square C4, southwest quadrant, layer 8 to layer 9, DBDP 1.30 m (skull), NW 315°. Supine, extended, primary burial. Disturbances of the lower arms, pelvis, right femur. The lower half of the femora and the remainder of the legs are in the baulk.

Age: Middle-aged (dental wear and tooth loss).

Sex: Male (cranial and infracranial morphology).

Stature: 169.7 ± 7.6 cms (5' 7") [segment measurement left femur].

Completeness: Incomplete infracranial skeleton and partial skull. The skull is represented by the right parietal, right occipital fragment, right temporal, right zygoma, maxilla and right half of the mandible, missing the condyle. There are some loose left maxillary teeth. Infracranial remains include fragments of the scapulae, clavicles, the left humerus missing the head, right humeral shaft fragment, left proximal femur, left hand, some rib fragments, the first through tenth thoracic vertebrae, and some miscellaneous remains.

Preservation: Good - Fair. The portions of the cranium present are well preserved and reconstructed. The vertebral bodies are also well preserved. Some reconstruction of the scapulae and humerus was possible, but there are not enough bone fragments to represent the missing portions of the skeleton. The bone texture is coarse, color is light beige; there is a slight light ring to the remains which are generally lightly mineralized.

Additional human remains: None.

Dental pathology: Premortem loss of the maxillary right first molar and fourth premolar. There are interproximal caries in the mandibular right first and second molars and the maxillary left canine and lateral incisor. There is evidence of alveolar reactive bone on the posterior sockets of the mandible. There is chipping of the enamel of the distal edge of the mandibular first molar and proximal edge of the fourth premolar. Dental wear exposes the pulp in the mandibular canine and third premolar, and the dentin in all other teeth. Slight calculus and moderate alveolar resorption are present in the posterior tooth sockets.

Cranial pathology: Cranial vault thickness ranges from 5 - 7 mm. A small perforation of the right temporal above the auditory meatus penetrates the outer cortex, exposing the diplöe. Some coarse porosity surrounds the defect but no reactive bone. Possible chronic mastoiditis.

Skeletal pathology: Slight vertebral osteoarthritis.

Noteworthy features: The distal end of the femoral shaft has fresh white saw marks where it was removed from the baulk.

Comments: Photographs: right temporal and patella. Radiograph: right temporal.

Burial No.: BC 10

Archaeological context: Early Period V/Middle Period VI, square C4, northeast quadrant, layer 9, DBDP 1.43 m (humerus), NNW 340°. Disturbed mandible and upper body with potsherds.

Age: 11 - 13 years (dental eruption and epiphyseal fusion).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Partial upper infracranial skeleton and partial mandible and maxilla. The cranium is represented by the mandible, missing the ascending ramus on the left and the right gonion and condyle, right maxillary fragments with molars, third premolar and canine *in situ* and the loose left second molar and central incisors. Infracranial remains include bilateral scapular fragments, right humeral diaphysis, proximal ulnae fragments, left distal humeral diaphysis, fragments of the cervical vertebrae, one thoracic vertebra, one lumbar vertebra, and a few ribs.

Preservation: Good. What is present is well preserved. Small amounts of reconstruction of the vertebrae and scapulae were required. There is weathering of the cancellous bone and no epiphyses were preserved. The bones are orange-brown in color and coarse in texture. There are very few fragments present.

Additional human remains: A single left maxillary central incisor (adult) with wear to the dentin.

Dental pathology: Slight enamel hypoplasia, coarse pitting and linear pitting, in the mandibular canines, the right mandibular third premolar, and the right maxillary third premolar. Possible retained right maxillary deciduous canine, prohibiting or delaying eruption of the permanent canine on the right side. The deciduous tooth is not recovered, but the socket is intact. Radiograph documents the presence of the complete right maxillary canine unerupted in the alveolus. The hypoplasias occur at age 3 to 3.5 years and age 5 to 5.5 years. Dental attrition is slight.

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features: Winging of the left mandibular central incisor.

Comments: Photographs: mandible and maxilla. Radiographs: mandible, maxilla, and right humerus.

Burial No.: BC 11

Archaeological context: Middle Period VII, square C5, south quadrants, layers 8 and 9, DBDP 1.06 m (skull fragment), ESE 116°. Supine, extended, primary burial with disturbance of the cranium, femora, left lower arm and left lower leg. Broken pottery is scattered over the body.

Age: 17 - 23 years (epiphyseal fusion and auricular surface morphology).

Sex: Female (*os coxae* morphology).

Stature: 154.1 ± . cm (5' 0") [left humerus].

Completeness: Moderately complete infracranial remains and fragmentary cranium. The vault is represented by fragments of the left parietal and the right parietal at the sagittal suture. Maxillary and mandibular teeth from both sides are present. The infracranial skeleton is missing the medial clavicles, scapular blades, left glenoid, left forearm, most hand bones, right femur except the proximal end, left femur, tibia and fibula, right proximal tibia, head of the right fibula, patellae, left talus and first and second cuneiforms, most foot phalanges, and the cervical vertebrae.

Preservation: Poor - Good. The cranium is poorly preserved, fragmentary and unreconstructible. There are insufficient fragments to complete reconstruction. The teeth are extremely fragile with the enamel separating from the dentin. The infracranial remains are well preserved, requiring minimal reconstruction of the long limb bones. The bone is light tan in color, coarse to the touch, and sounds partially mineralized. There is some weathering loss of the cancellous bone especially the *os coxae* and some vertebral bodies.

Additional human remains: Possible intrusive right maxillary lateral incisor which, in contrast to other teeth, is very well preserved.

Dental pathology: Dental wear has flattened the molar cusps and exposed dentin in the anterior teeth. Slight rolled rim is present in the right mandibular alveolus. The third molar is erupted.

Cranial pathology: Small amounts of healed fine cranial vault porosis are noted on the outer table, but does not perforate to the diplöe. Cranial vault thickness ranges from 5 - 6 mm, measured in the fragments available.

Skeletal pathology: Slight appendicular and vertebral osteoarthritis is noted. There is an additional "facet" of the anterior superior calcaneus, lateral to the anterior facet. Preauricular sulci suggest childbirth.

Noteworthy features:

Comments: Aging: Auricular surface IV 35-39; iliac crest and medial clavicle epiphyses open, and the vertebral rims have not yet fused to the centra. Photographs: preauricular sulci and calcaneus. Radiograph: right humerus.

Burial No.: BC 12

Archaeological context: Early Period V/Middle Period VI, square C5, north quadrant, layer 9, DBDP 1.25 m (skull), NNW 316° (corrected). Badly disturbed supine burial.

Age: Middle-aged (dental wear and osteoarthritis).

Sex: Male (cranial morphology and humeral head diameter).

Stature: 171.5 ± . cms (5' 7½") [segment measurement right humerus].

Completeness: Fragmentary infracranial skeleton and skull. The skull is represented by the temporals, occipital and fragments of the left parietal and frontal, right facial bones, left posterior maxilla, the right mandibular ascending ramus and right second molar. Infracranial remains include the bilateral scapulae, right distal clavicle, right humeral head and capitulum, proximal ulnar fragment, right femoral shaft fragments, fibula fragment, some rib fragments, the first five cervical vertebrae, the tenth and eleventh thoracic vertebrae, the fifth lumbar vertebra, xiphoid, hyoid, and other miscellaneous fragments.

Preservation: Fair. The cranium was minimally reconstructed. The scapulae were reconstructed. The vault fragments are weathered, exfoliating and held together by preservative. There is a thin coating of preservative on some of the bones. Preservative applied to the teeth restricts observations. The bone is discolored, mottled green, with grey dirt adherent. Infracranial bones are light tan in color and coarse to the touch.

Additional human remains: None.

Dental pathology: There is moderate calculus on the posterior teeth. Dental wear exposes the dentin of the first two maxillary molars. The dentin is stained orange. There is slight alveolar resorption of the bone around the third molars. There is an hypocalcification defect of the maxillary right fourth premolar. The maxillary right second molar and the mandibular right second molar have chipping of the interproximal enamel.

Cranial pathology: The right mandibular condyle has a round, smooth-walled defect of the posterior articular surface. There is no osteoarthritis, but the anterior condylar surface is reduced and irregular. Cranial vault thickness of the left parietal eminence and asterion is 7 mm. There is a small opening in the fusion line between the tympanic plate and the temporal, superiorly on the left side. A probe doesn't penetrate to the interior. There is no reactive bone surrounding the defect. Possible developmental defect of the left suprameatal triangle.

Skeletal pathology: Slight to moderate osteoarthritis of the appendicular skeleton.

Noteworthy features: Very robust individual. Large apical process of the dens.

Comments: Aging: Cranial suture closure $\Sigma>2$ >30.0±9.6. Photographs: hypocalcification of the teeth, dens, left temporal, right mandibular condyle. Radiographs: left mastoid, mandible.

Burial No.: BC 13

Archaeological context: Early Period V/Middle Period VI, square C5, southeast quadrant, layer 9, DBDP 1.41 m (femur), SE 132°. Badly disturbed supine burial.

Age: Adult (infracranial bone size). [around 40 years based on fragment of auricular surface].

Sex: Male (infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary lower infracranial skeleton. The medial right tibial plateau, the right femoral shaft missing most of the medial side, the left femoral shaft, the bilateral *os coxae* including the acetabula and the upper sciatic notch are present.

Preservation: Poor. The long limb bones are incompletely reconstructed from fragments. Neither femora is complete enough for a segment measurement. Few measurements could be recorded. The bone is light tan in color. There is a thin layer of preservative over the bone which colors those areas somewhat darker brown. The bone doesn't sound fossilized. The acetabular bone is soft, flaky, and brown in color. Weathering of all surfaces is extensive.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: No osteoarthritis of the acetabula.

Noteworthy features:

Comments: Very little data could be collected.

Burial No.: BC 14

Archaeological context: Late Period X, square C6, northeast quadrant, layer 10, DBDP 0.89 m (tibia), W 270°. Fragmentary burial of a child consisting of deteriorated lower long limb bones extending through bronze anklets, remains from the jaw, glass beads, thin bronze necklace fragments, clay rollers, and ceramic vessels.

Age: 5 - 7 years (dental eruption and wear).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Loose teeth. The maxillary permanent canine and right first molar crowns are present. The mandible is represented by the first molars, right premolars, central incisors and right lateral incisor. Other tooth fragments are present but unidentifiable. A single deciduous mandibular first molar crown is also present.

Preservation: Poor. Fragmentary and incomplete remains. The teeth are very brittle, fragile and stained light green. The roots are easily broken off.

Additional human remains: None.

Dental pathology: Enamel attrition of the single deciduous tooth crown.

Cranial pathology:

Skeletal pathology:

Noteworthy features:

Comments: None of the long limb bone fragments noted by the excavators are present in the laboratory. Age estimate is based on the absence of wear facets on the permanent first molar and the development of the permanent canine and premolar crowns.

Burial No.: BC 15

Archaeological context: Middle Period VI, square B6, layer 6, DBDP 1.37 m (fibula), NW 317° (corrected). Lower legs extending from baulk into square. A large pot is present beyond the feet.

Age: Adult (epiphyseal fusion).

Sex: ?Female (infracranial bone size).

Stature: 152.3 ± 3.5 cms (5' 0") [right tibia].

Completeness: Incomplete lower legs. The tibiae, the left missing the medial malleolus, the fibulae, and the feet are present. The right foot includes the calcaneus, talus, navicular, first cuneiform, first, second and fifth metatarsals, and a single phalanx. The left foot includes the calcaneus, cuneiforms, the third through the fifth metatarsals, and a single phalanx.

Preservation: Good. The long limb bones are well preserved. There are few fragments for reconstruction. No reconstruction of the long bones was possible because of missing fragments. Some weathering damage to the cancellous portions of the long limb bones and the tarsals is present. The bone color is a light tan with grey-green mottling.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the long limb and foot bones.

Noteworthy features:

Comments: Radiographs: right tibia, fibulae.

Burial No.: BC 16

Archaeological context: Middle Period VI, square B5, layer 10, DBDP 1.45 m (skull), SE 146°. Upper body of supine burial with the portion of the skeleton below the elbows in the baulk. The skull was badly fragmented *in situ*. Ceramic vessels beyond the skull.

Age: 20 - 30 years (sternal rib end and dental wear).

Sex: Female (cranial morphology and humeral head diameter).

Stature: 158.4 ± . cms (5' 2¼") [right humerus].

Completeness: Partial upper infracranial skeleton and partial skull. The skull is represented by the mandible missing the left condyle, the occipital, right temporal, fragment of the left parietal, frontal and sphenoid, the anterior maxilla, and the left zygoma. Infracranial remains include the distal right clavicle, right acromion and coracoid process, right humerus missing the distal end, left humeral midshaft, right ulna and radius missing the ends; right third metacarpal, rib and vertebral fragments.

Preservation: Fair - Poor. The humerus, mandible and right temporal are well preserved. The bone is considerably weathered and exfoliating. Little reconstruction of the vault was possible. The infracranial remains have loss of all cancellous bone, and little reconstruction was possible here either. The bone is brown in color and coarse in texture.

Additional human remains: A subadult proximal ulna and zygoma.

Dental pathology: The right maxillary fourth premolar is discolored grey-brown. There is enamel hypoplasia (horizontal line of pits and groove) in the mandibular second molars and the maxillary third premolars, occurring at age 4-5 years and 6-6.5 years. There are small white opacities in the mandibular and maxillary canines. There is a large occlusal caries in the left maxillary second molar and a small fissure caries in the left mandibular second molar. A light brown stain is noted on the lower buccal cusp of the right mandibular third premolar. There is slight calculus and enamel wear with flattened cusps and dentin exposure in the anterior teeth.

Cranial pathology: The mandibular left coronoid process appears reduced in size and withered to a point. There are some small spots of reactive bone. Cranial vault thickness measured at the left frontal eminence and the right asterion is 4 mm.

Skeletal pathology: Slight osteoarthritis of the vertebral and appendicular skeleton.

Noteworthy features:

Comments: Aging: Sternal rib end IV 24-32; Cranial suture closure $\Sigma \geq 0 \geq 30.0 \pm 9.6$. Photographs: teeth, mandible. Radiograph: mandible.

Burial No.: BC 17

Archaeological context: Middle Period VI?, square C3, northeast quadrant, layers 6-7, DBDP 1.36 m (skull), orientation unknown. Badly disturbed and incomplete, with associated ceramics.

Age: Middle - old aged (dental wear and tooth loss).

Sex: Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and partial skull. The skull is represented by the left mandibular body, temporals, most of the occipital and fragments of the parietals and frontal. Infracranial remains include the right clavicular shaft, left scapular fragments, right humeral shaft fragments, left femoral shaft, left talus, few cervical and vertebral arches and body fragments.

Preservation: Fair - Poor. The right mandible is well preserved. The cranial vault was fragmented and the majority of bones were reconstructed, but the vault could not be restored. Weathering and exfoliation is present on all of the skeletal fragments. The infracranial remains could not be reconstructed. Almost no cancellous bone is present.

Additional human remains: None.

Dental pathology: Premortem loss of the three left mandibular molars, with incomplete resorption of the first molar sockets. Premortem loss of the left maxillary second molar. There is linear pitting hypoplasia in the left mandibular third and fourth premolars, at around age 4 years. Wear to the dentin in the premolars and enamel wear on all other teeth. There is a large caries exposing the pulp and an apical abscess of the mandibular left canine. A light brown stain is noted on all of the tooth crowns, at the inferior crown on the buccal surface.

Cranial pathology: Thickening of the anterior frontal and posterior parietals, but surface exfoliation prevented reliable measurements. Evidence of porosity of the external vault is found on close inspection but is healed. Breakage of the vault shows external cortex is thickened.

Skeletal pathology: Slight osteoarthritis of the vertebral facets and the occipital condyle.

Noteworthy features:

Comments: Photographs: parietal bone fragment, left mandible.

Burial No.: BC 18

Archaeological context: Middle Period VI, square B5, layer 10, DBDP 1.56 m (tibia), NW 312° (corrected). Supine, extended burial with the skull presumably still in the baulk. A large pot is found over the knees. The left arm, left upper femur, and upper thorax are missing due to later disturbances. *In situ* measurements: right tibia length 355 mm, right femur length 430 mm.

Age: Middle-aged (osteoarthritis).

Sex: Male (size and robusticity of the infracranial skeleton).

Stature: 157.8 ± 7.7 cms (5' 2") [segment measurement right femur].

Completeness: Partial infracranial skeleton. Missing are the cervical, thoracic and upper lumbar vertebrae, ribs, clavicles, scapulae, right proximal humerus, left upper humerus, most of the hands, the distal ends of the ulnae and radii, most of the left leg bones, the right patella, the medial and distal phalanges of the feet, and most of the *os coxae*.

Preservation: Fair. The right side of the skeleton is better preserved. The long limb bone shafts are sturdy. The left leg bones could not be reconstructed. The bone is coarse and brown with some mottled staining and light grey dirt adherent. Most cancellous bone has been lost. No bone could be completely restored. Few observations and measurements are possible.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight to moderate osteophytosis of the lower thoracic vertebral rims in the few fragments available.

Noteworthy features: Strong muscle markings of the femora and upper limb bones.

Comments:

Burial No.: BC 19

Archaeological context: Early Period V/Middle Period VI, square C3, southwest quadrant, layer 7, DBDP 1.48 m (skull), NW 315°. Supine, extended burial with the arms straight at the sides. Disturbance of the femora, *os coxae* and distal left arm. *In situ* measurements: left humerus length 286 mm, left fibula length 330 mm.

Age: Young adult (dental wear).

Sex: Female (cranial morphology and infracranial bone size).

Stature: 154.7 ± 7.3 cms (5' 1") [segment measurement left humerus].

Completeness: Partial infracranial remains and fragmentary skull. The skull is represented by the mandible, right maxilla, and left maxillary molars and premolars, and fragments of the vault. The infracranial remains include fragments of the scapulae, left clavicular midshaft, humeral shafts, ulnae fragments, right radial fragment, right femoral fragments, tibiae and fibulae shafts, most of the right foot, left calcaneal fragments and left first metatarsal.

Preservation: Fair - Poor. The dental remains are well preserved. The cranial vault is poorly preserved, coated with preservative, fragmentary, and unable to be reconstructed. The mandible could not be restored. The infracranial remains are generally missing the cancellous bone due to weathering. Cleaning marks are evident on many of the bones. There is black staining on the left tibia and fibula. Preservative was applied to the skull and infracranial remains, but little reconstruction was possible and there are no complete bones.

Additional human remains: None.

Dental pathology: Slight calculus and slight rolled rim are noted in the right mandibular posterior sockets. The mandibular third molars are erupted but impacted. The maxillary third molars are presumed agenetic (not recovered and no socket on the right). There is a light brown stain on the lower crowns of the molars, buccal surface.

Cranial pathology: No evidence of cranial thickening, but there is some porosity of the external vault which appears healed. Cranial vault thickness is measured at the obelion, parietal eminence, and bregma, 5 - 7 mm.

Skeletal pathology: Slight appendicular osteoarthritis.

Noteworthy features:

Comments: Aging: Cranial suture closure $\Sigma \geq 0$ $\geq 30.0 \pm 9.6$. Photographs: impacted mandibular third molars, tooth wear.

Burial No.: BC 20

Archaeological context: Early Period V/Middle Period VI, square B5, layer 10, DBDP 1.58 m (skull), NW 315°. Supine, extended, primary burial. Associated with a large bone spearhead near lower left arm, a hair pin at right side of skull and other bone and ceramic artifacts. Noted in the field records to be a large and robust individual. *In situ* measurements: left and right humeri lengths 320 mm, right radius length 240 mm, left femur length 430 mm, right femur length 435 mm, left tibia length 390 mm, right tibia length 375 mm, left fibula length 385 mm, right fibula length 360 mm.

Age: 35 - 40 years (ectocranial suture fusion, sternal rib end and auricular morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 170.7 ± 4.0 cms (5' 7") [left femur].

Completeness: Substantially complete infracranial skeleton and skull. The skull is missing the right mandibular incisors, and some fragments of the left temporal. The infracranial skeleton is missing the scapulae bodies, left clavicle, few hand bones, the foot phalanges, the first through the seventh thoracic vertebrae, the body of the eighth thoracic vertebra, the pubic rami and most ribs.

Preservation: Excellent - Good. The infracranial remains are well preserved. Very little reconstruction (except of the scapula) was required. The bone is coarse in texture and brown in color. The skull required extensive reconstruction. The face was restored to the vault with some asymmetry. There is weathering bone loss of the superior right parietal and the left temporal.

Additional human remains: None.

Dental pathology: Moderate calculus on all of the teeth. There is no caries or abscessing. There is slight periodontal disease (rolled rim and alveolar resorption) of the posterior mandibular alveolus. Dental attrition exposes the pulp in the incisors, the dentin in the rest of the anterior teeth, while the molars have enamel wear. There is orange staining on the mandibular right third premolar and second molar, and the maxillary right third premolar and left fourth premolar. The maxillary right third molar is chipped on the buccal surface. Enamel hypoplasia in multiple teeth scatters over ages 1.5 to 6.0 years.

Cranial pathology: There is a healed, depressed, oval defect of the right frontal above the superior temporal line and the right orbit. The defect measures 32 x 23 mm and slopes inward to a single bone layer. There is no active bone formation. There are no fracture lines extending from the defect. There is slight mounding of the internal table at the right lateral edge of the depression. Under magnification there are no signs of scratching, scraping or incising of the outer table. Cranial vault thickness measurements range from 5 - 10 mm. Trace, healed cribra orbitalia. There is a small porotic defect of the left mandibular condyle.

Skeletal pathology: Slight vertebral and appendicular osteoarthritis. There is a thickening and heaviness of the left proximal tibia around the nutrient foramen. The left tibia was reconstructed at the approximate midshaft. There is no evidence of periostitis, the cortex is smooth, dense and completely remodeled. There is no apparent rotational deformity, a slight length discrepancy, but diameter measurements here are larger than on the right side. The normal "S" shaped curve of the anterior tibial spine is lost on the left side. There is moderate osteoarthritis of the proximal fibular facet, which is greater than the right side. On the anterior-posterior radiograph the medullary cavity appears intact with good visualization of the cortex, while the lateral view demonstrates a loss of bone marrow in the defect. There is an oval-shaped multifocal radiolucent area (like a figure 8) of the proximal third of the diaphysis of the left tibia, at the level of the observed thickening. The lesion (35 x 20 mm) lies below the metaphysis, encompasses most of the medullary cavity, follows the long axis of the bone, and appears to lie toward the medial side. The margins are indistinct, there is no sclerosis, and the interior of the lesion has a consistency similar to the rest of the shaft, suggesting the lesion is inactive or healed. Differential diagnosis includes bone cyst, or well healed childhood fracture. Schmorl's nodes of the fourth and fifth lumbar vertebrae. The radial head articular surface extends distally on the medial surface of the head. There is an accessory flexion facet on the posterior distal lateral condyles of the femora as well as a cortical defect on the medial posterior surface. The spinous process of the seventh cervical vertebra is flattened and porotic, probably the result of fracture of this area. The right capitate has a smooth-walled lytic defect at the edge of the trapezoid articular facet.

Noteworthy features: *Os inca*, third trochanter of the right femur, huge calcaneal peroneal facets. The patellae have large medial surfaces which give the patellae a heart shape.

Comments: Aging: Auricular surface IV 35-39; Sternal rib end IV-V 28.2±3.83-38.8±7; Cranial suture closure post. $\Sigma \geq 3$ ≥34.7±7.8, ant. $\Sigma \geq 1$ ≥32.0±8.3. Photographs: cranium, calcanea, seventh cervical vertebra, patellae, fibular facet, lower lumbar vertebrae, distal femur. Radiographs: tibiae, fibulae, humeri, cranium, right femur.

Burial No.: BC 21

Archaeological context: Early Period V^{+}, square C5, southeast quadrant, layer 10, DBDP 1.54 m (femur), ESE 110°. Burial badly disturbed and incomplete, the head, arms and torso are missing.

Age: Adult (size and epiphyseal fusion).

Sex: ?Female (infracranial bone size).

Stature: 154.7 ± 5.8 cms (5' 1") [segment measurement left tibia].

Completeness: Fragmentary infracranial remains and two cranial vault fragments. Present are the bilateral femoral heads, bilateral tibial shafts missing the ends, a fragment of the anterior femoral shaft, the left third metacarpal, hand and foot phalanges, two ulnar shaft fragments, left distal fibular shaft fragment, calcaneal fragment, and several other small fragments.

Preservation: Poor. The remains are fragmentary, incomplete and poorly preserved. The right femoral head is blackened in places and the bone feels hardened and smooth. The posterior shaft of the left tibia is stained black. There are old marks of disturbance on these bones. There are longitudinal cracks in the tibial shaft fragments. The bone is reddish brown in color, and coarse in texture.

Additional human remains: A large adult, ?male, left tibia, missing the ends. There are large post-depositional cut marks, obliquely across the anterior spine of this bone.

Dental pathology:

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments: The left fibular shaft fragment, right ischial tuberosity fragment, right nasal bone and cranial vault fragment, weathered calcaneal fragment, two hand and foot phalanges were added from Bag #1028 [C5, SEQ, layer 10, 4-6-74] and a hand phalanx fragment from Bag #1211 [C5, NWQ, level 11, 13-6-74].

Burial No.: BC 22

Archaeological context: Middle Period VII-VIII; square C4, southeast quadrant, layer 7, DBDP 0.95 m, orientation unknown. Cluster of sherds and bones.

Age: 18 - 20 years (distal radial epiphyseal fusion, single vertebral body with unfused rim).

Sex: ?Male (cranial vault size).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. Included are the frontal along the coronal suture, the right petrous and auditory meatus fragment, the left maxillary canine and third premolar. Nineteen rib fragments from the right side, six cervical and thoracic vertebral fragments, fragments of the distal right humerus, right radius, the coronoid process of the right scapula, clavicular midshaft, and sternal fragments are present.

Preservation: Poor. Very fragmentary remains. All surfaces are weathered and worn with multiple fractures, both old and new. Some of the rib heads were restored, as was the frontal bone along the conoid process. Insufficient fragments for a complete skeleton. Bone color is white-tan with grey mottling on some pieces.

Additional human remains: None.

Dental pathology: Slight calculus is present on the third premolar. There is a horizontal linear hypoplasia in the canine which occurs at age 3.5-4 years. Dental wear is of the enamel only. The maxillary left third premolar has chipping on the mesial crown.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features:

Comments:

Burial No.: BC 23

Archaeological context: Early Period V, square C5, south quadrants, layer 11, DBDP 1.73 m (skull), NW 322°. Supine, extended burial with a ceramic vessel at the feet, four bronze bracelets around the left forearm, a cache of clay balls beyond the right side of the skull, and a socketed bronze adze head at the left shoulder. Disturbance has removed the right femur and left foot. *In situ* measurements: minimum frontal breadth 102 mm, orbital height 37 mm, orbital breadth 40 mm, nasal height 60 mm, nasal breadth 28 mm, upper facial height 75 mm, symphysis height 32 mm, bizygomatic breadth 150 mm, left humerus length 310 mm, left radius length 245 mm, left clavicle length 150 mm.

Age: 45 - 50 years (auricular surface morphology, dental wear, ectocranial suture fusion).

Sex: Male (cranial and *os coxae* morphology).

Stature: 168.7 ± . (5' 6½") [right radius].

Completeness: Moderately complete infracranial skeleton and skull. The skull is missing the left mandibular condyle, the left central incisor, the right temporal (except the mastoid process) and portions of the face. The infracranial remains are missing the right femur distal to the greater trochanter, the left patella, the left femoral condyles, most of the fibulae, most of the left foot, most of the right foot phalanges, the left *os coxae*, sternum and hyoid horns.

Preservation: Good - Excellent. Many parts of the skeleton are beautifully preserved but incomplete. The cranial vault was reconstructed but the face could not be restored to the vault. The maxillary canines and incisors have a slight blue-green stain on the labial enamel. The vertebrae and ribs were extensively repaired. Only a single long limb bone is intact. There are insufficient fragments to complete reconstruction. The bone color is light tan and bone has coarse texture. There is a greenish stain on the lower shafts of the left ulna and radius.

Additional human remains: A single lateral mandibular incisor, the second and third cervical vertebrae of a smaller individual (?female).

Dental pathology: There is premortem loss of the mandibular left third molar. There is wear of the entire crown of the mandibular left first molar with abscessing at the roots. Small linear hypoplastic pitting of the mandibular canines, which occurs at age 4.0-4.5 years. Pulp exposure is noted in the molars of both jaws and dentin exposure in the anterior teeth. Calculus is slight to moderate. The mandibular right molars have a slight brown stain on the lower crown.

Cranial pathology: Cranial vault thickening of the frontal and parietals ranges from 5 mm to 11 mm. No cribra orbitalia. Healed coarse porosity of the cranial vault, superior parietals and superior frontal.

Skeletal pathology: There is active reactive bone growth on the internal border of the left eighth through eleventh ribs. The right glenoid fossa has moderate osteoarthritis with an expanded articular surface and enlarged nutrient foramen. A small fragment of the right humeral head exhibits lytic lesions at the edge of the articular surface. Radiograph of the right humeral head and scapula demonstrate involvement of both sides of the joint, smooth-walled lytic lesions with surrounding sclerosis, possibly a synovitis or tuberculous arthritis. There is a small osteophyte on the medial border of the distal right tibia, 7 x 7 mm in diameter and raised 1 mm off the cortical surface, which appears to be cortical bone. There is a smooth-walled, lytic defect of the lateral surface of the head of the right fourth metatarsal. The defect occurs next to the articular surface, with no visible reactive bone. Radiograph of the metatarsal shows a small, circular area of reduced bone density at the affected area without sclerosis. The right proximal first metacarpal phalanx appears swollen and coarsely textured, but without newly reactive bone formation. There is no apparent shortening or deformity. There is a small semi-circular defect on the lateral surface of the phalanx (7 x 8 mm) which is slightly depressed, and has a smooth floor which contrasts markedly with the rest of the bone. Radiograph of the phalanx demonstrates a mottled interior cortex, with an irregularly shaped, lobulated area of reduced density, surrounded by sclerotic bone. Differential diagnosis includes enchondroma.

Noteworthy features: Thirteen thoracic vertebrae?. There is a lateral bridge to the superior facet of the first cervical vertebra. This is a very large, robust individual.

Comments: Aging: Auricular surface VII 50-60; Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Bag #966 ["vicinity of Burial 23"] is too small for this burial and thus represents another person. The left cuneiform, first metatarsal and distal foot phalanx were added from Bag #963 [18-6-74 C5 SEQ level 10]. A foot phalanx was added from Bag #1010 [3-6-74 C5 SWQ Level 10]. The left patella was added from Bag #1117 [3-6-74 C5 SWQ Level 11]. The left calcaneus and a foot phalanx were added from Bag #1028 [24-5-74 C5 SEQ Level 10] and the distal left tibia was added from Bag #1161 [4-6-74 C5]. Two proximal hand phalanges were added from Bag #1237 [17-6-74 C5 Level 11] and an inferior sacral fragment was added from Bag #1259 [19-6-74 C5 SEQ Level 12]. Photographs: cranium, first cervical vertebra, ribs, tibia, right first metacarpal phalanx, scapula, humeral head. Radiographs: left ribs, left tibia, right phalanx, humeral head and scapula, cranium.

Burial No.: BC 24

Archaeological context: Early Period II, square C5, northwest quadrant, layer 11, DBDP 1.64 m (skull), N 9° (corrected). Burial disturbed by Burial 31. Supine, extended, primary burial with disturbance of the head, shoulders, midsection and feet. Pottery was found near the cranium and beyond the feet.

Age: Adult (infracranial bone size).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and fragmentary skull. The skull includes the bilateral mandibular body with teeth *in situ*, loose maxillary teeth, fragments of the occipital and left parietal, and the supraorbital structure of the frontal. Infracranial remains include fragments of the left upper limb, the right distal midshaft of the femur, fragments of the tibial and fibular shafts, fragments of the left ankle and the left third through fifth metatarsals.

Preservation: Poor. Very fragmentary remains. Extensive reconstruction of the long limb bones for estimating midshaft measurements. No cancellous bone is preserved in the infracranial remains. The cranium could not be reconstructed. There is considerable weathering of the cranial bones. The infracranial bone is light tan in color and coarse in texture. The cranial bones are soft and pinkish in color. The bone is not mineralized.

Additional human remains: None.

Dental pathology: Tooth wear is to the pulp in the mandibular first molars. There is premortem loss of the mandibular posterior molars. Abscessing of the mandibular right second premolar with wear to the pulp chamber. Differential tooth wear. Slight hypoplasia in the maxillary canines, left lateral incisor, and the mandibular right canine. There is a caries in the maxillary left second incisor on the buccal surface.

Cranial pathology: None noted.

Skeletal pathology: The left third metatarsal has an enlarged nutrient foramen on the medial side of the proximal midshaft.

Noteworthy features: Possible cultural use of teeth.

Comments: The supraorbital bone fragment is hard and yellowish tan while the remaining skull fragments are soft reddish tan. The left third through fifth metatarsals were reassigned here from BC Burial 31. Photographs: dental wear, left third metatarsal, and dental abscessing.

Burial No.: BC 25

Archaeological context: Early Period II, square B6, layer 14, DBDP 2.23 m (skull), W 260°. Disturbed, supine primary burial with the arms extended along side. The left arm, lower thorax and legs from the midshaft of the femora are disturbed. Three large pots were located beyond the head. *In situ* measurements: right clavicle length 136 mm, nasal height 40 mm, nasal breadth 27 mm, upper facial height 57 mm, total facial height 100 mm.

Age: 12 - 15 years (dental eruption and epiphyseal fusion).

Sex: ?Male (femoral head diameter).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and fragmentary skull. The cranium consists of fragments of the parietals and frontal, petrous fragments, mandibular dentition, maxillary dentition, and loose third molars. The infracranial remains include the right clavicle, fragments of the right humerus, right radial head epiphysis, right ulnar fragment, ilium and ischial fragments, left proximal femur and epiphysis, sacral fragments, lower lumbar vertebrae, right first and second metacarpals and proximal hand phalanges, and miscellaneous bone fragments.

Preservation: Poor. The remains are extremely fragile, fragmentary and incomplete. The cranium could not be reconstructed and very little reconstruction of the infracranial remains was possible. The bone is exfoliating, weathered, and there is much loss of cancellous bone. The bone is dark brown in color, mottled, with blackening of many of the fragments. The radial head epiphysis is greenish grey. The bone has a porcelain ring and appears slightly shiny.

Additional human remains: None.

Dental pathology: There is wear of the central incisors of both jaws which exposes the dentin. No caries or abscessing. Dental enamel pitting and linear hypoplasia are noted in the maxillary incisors and canines, and mandibular canines, occurred at ages 0.5-1.0 years and 2.0-3.5 years. Slight calculus is noted on most teeth.

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments: Photographs: maxilla and mandible.

Burial No.: BC 26

Archaeological context: Early Period IV, square B5, layer 11, DBDP 1.92 m (femur), N 360°. Supine, extended, primary burial with two pots over the feet. The femora, tibiae, fibulae, feet, right patella are *in situ*; the remainder of the burial is in the baulk.

Age: Middle-aged (osteoarthritis).

Sex: Male (infracranial bone size).

Stature: 161.5 ± 6.0 cms (5' 3") [left tibia].

Completeness: Substantially complete lower limbs and hands. The right hand includes the first through the third metacarpals, scaphoid, hamate, lunate and three phalanges. The left hand includes the second and third metacarpals, the capitate, lunate, hamate and four proximal phalanges. The shafts of the femora, tibiae, and fibulae and the right patella are present. The right foot is missing the calcaneus, most metatarsals and most phalanges. The left foot is missing the first metatarsal and the first phalanges.

Preservation: Fair. The long limb bone shafts required some reconstruction. There is warping of the right tibial shaft. The cancellous bone is weathered and much is lost. The bone is tan in color, light in weight, with some black- brown mottling.

Additional human remains: A single fragment of a fetal/infant rib.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritic lipping of the hand and foot bones. The *linea aspera* of the femora are drawn upward and outward from the bone shaft with a "cupping" effect of bone along the medial side. The femoral shafts appear unusually anteriorly bowed. There is a well marked insertion at the posterior tibial shaft, medial to the nutrient foramen.

Noteworthy features: Squatting facets of the distal tibiae and tali.

Comments: From Bag #1169 [7-6-74 B5 Level 12] pubic ramus and hand phalanges, and from Bag #1171 [6-8-74 B5 Level 13] a thumb phalanx. Photographs: femora.

Burial No.: BC 27

Archaeological context: Middle Period VI', square C6, southeast quadrant, layer 13, DBDP 1.44 m (pelvis), ESE 115°. Supine, extended burial with disturbance of the upper legs and midthorax. The shoulder and head areas of the skeleton are in the baulk. A skull was found where the distal femur should have been. Pottery fragments to the right of the legs and beyond the feet.

Age: 25 - 30 years (auricular surface morphology, sternal rib ends, sacral fusion).

Sex: Female (*os coxae* morphology).

Stature: 155.0 ± 5.8 cms (5' 1") [segment measurement left tibia].

Completeness: Partial infracranial skeleton and fragmentary skull. The cranium is represented by fragments of the posterior sagittal suture, lambda, and right parietal. The infracranial remains are missing the cervical vertebrae, first through the eleventh thoracic vertebrae, scapulae, clavicles, proximal humeri, distal right forearm bones, ends of the left femora, most of the hands, right pubic symphysis, femora except the heads, tibial ends, right patella, right fibula, right foot, the ends of the left fibula, left foot except the talus, calcaneus, and third metatarsal.

Preservation: Good - Fair. The lumbar vertebrae, sacrum, and *os coxae* are well preserved, requiring minimal reconstruction. Most of the bones have fresh breakage but there are not enough fragments present to reconstruct the missing portions. The bone is light yellow-brown in color, coarse in texture, but not mineralized. There is weathering loss of some of the cancellous bone. The cranial bones were reconstructed. There are very weathered green stains at the lambda.

Additional human remains: Fragment of a right *os coxae* (?male), skull vault fragments which are orange colored and do not match this cranium [from Bag #1137].

Dental pathology:

Cranial pathology: The sagittal suture is nearly obliterated, which is not consistent with the age of the infracranial remains, thereby raising a question of the association. The cranial vault is 8 mm thick at the lambda and obelion.

Skeletal pathology: No osteoarthritis. Large preauricular sulci bilaterally suggest childbirth. There are no parturition pits of the right pubis.

Noteworthy features: Squatting facet of the distal left tibia.

Comments: Aging: Auricular surface II 25-29; Sternal rib end V 24-32. Photographs: sacrum, preauricular sulci. Bag #1137 [Level 14 "Burial 27" C6 SEQ] contained two animal bone fragments, the right lateral supracondylar fragment of the humerus, and a reddish orange cranial vault fragment]. Bag #1081 [30-5-74 C6 SQ layer 13] contained the left talus.

Burial No.: BC 28

Archaeological context: Early Period V/Middle Period VI, square C6, northwest quadrant, layer 13, DBDP 1.51 m (radius), SE 115°. Supine, extended burial with disturbance of the cranium and the area below the pelvis. Distal limbs may be in the baulk. A pot is beyond the head. *In situ* measurements: humeri lengths 270 mm.

Age: 45 - 50 years (auricular surface morphology and tooth loss).

Sex: Female (infracranial morphology).

Stature: 149.2 ± . cms (4' 10¾") [left humerus].

Completeness: Partial infracranial skeleton and incomplete mandible. The skull is represented by the mandible missing the left ascending ramus, and some teeth. The infracranial remains are missing the left clavicle, left distal radius and ulna, right radius except the head, carpals, metacarpals and most phalanges, the right femoral shaft except the head and condyles, the left femoral head, the ends of the left tibia, the right tibia, most of the fibulae, feet, first, second and fifth cervical vertebrae, eleventh and twelfth thoracic vertebrae, most lower ribs, and most of the left *os coxae*.

Preservation: Good - Fair. The vertebrae, humeri, and scapulae are well preserved requiring little reconstruction. The innominates and sacrum are fragmented and could not be restored. There are insufficient fragments to complete reconstruction. Breakage in the right femur and the left fibula appears old. Bone is light tan to reddish brown in color and coarse in texture. The bone is not mineralized.

Additional human remains: Subadult scapular fragment.

Dental pathology: Premortem loss of the right molars, left first and second molars and premolars in the mandible. There is incomplete resorption of the alveolus at the right second molar socket. Wear in the loose incisor exposes the pulp, while wear in the third molar has flattened the cusps. There is an apical abscess in the mandibular right third premolar socket.

Cranial pathology:

Skeletal pathology: Slight appendicular and vertebral osteoarthritis. Slight osteophytosis of the lower lumbar vertebral bodies, especially the fourth and fifth. The vertebral bone appears very dense for the age of this individual.

Noteworthy features: The vertebrae do not appear old suggesting the mandible may not be appropriately associated, although it was excavated in anatomical position.

Comments: Aging: Auricular surface VI 45-49. Bag #1095 [31-5-74 C6 NQ Level 13] contained a middle hand phalanx and Bag #1092 [31-5-74 C6 NQ Level 13] contained a proximal hand phalanx. Photographs: mandible, lumbar vertebrae, auricular surface. Radiographs: left humerus.

Burial No.: BC 29

Archaeological context: Early Period V, square C3, southwest quadrant; layer 8, DBDP 1.68 m (ankles), SE 132°. *In situ* lower legs with the major portion of the burial in the baulk.

Age: 15 - 17 years (epiphyseal fusion).

Sex: Unknown. **Stature:** Cannot be determined.

Completeness: Fragmentary lower leg bones. The tibial shafts, proximal right fibula, distal fibular epiphyses, right navicular, first and second cuneiforms, fragments of the right metatarsals, the left second and third metatarsals, some foot phalanges, and miscellaneous bone fragments are present.

Preservation: Poor. Very fragmentary and incomplete. Some reconstruction of the tibial shafts was possible but incomplete. Most of the breakage is old. The bone is fragile, light in weight, pale tan with grey-black mottling. There are no complete bones.

Additional human remains: None. **Dental pathology:**

Cranial pathology: **Skeletal pathology:** None noted.

Noteworthy features:

Comments: Field drawing documents distal femoral shafts, but not identified in the laboratory.

Burial No.: BC 30

Archaeological context: Early Period V, square C3, northwest quadrant, layer 7, DBDP 1.52 m (tibia), SE 135°. *In situ* lower limbs with the upper portion of the burial missing.

Age: Adult (infracranial bone size).

Sex: ?Female (size of the fibular shafts). **Stature:** Cannot be determined.

Completeness: Incomplete lower leg bones. Present are the tibial midshafts, fibular shaft fragments, bilateral tarsal fragments, the right five metatarsals, and miscellaneous fragments.

Preservation: Poor. Fragmentary and incomplete. The tibial midshafts required reconstruction but are incomplete. The foot bones are weathered and incomplete. Bone color is white-tan and the bone has a coarse texture. All edges are weathered and most breakage appears old. The fibula is a lighter color than the tibia.

Additional human remains: None. **Dental pathology:**

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the calcaneus. **Noteworthy features:**

Comments: Comparisons of infracranial bone measurements suggest female sex. A bone fragment in Bag #1159 [C3 NWQ layer 6 - layer 8] glued to the tibia.

Burial No.: BC 31

Archaeological context: Early Period IV, square C5, northwest quadrant, layer 11, DBDP 1.85 m (knee), SSE 167°. Supine, extended, primary burial. The superior skeleton was cut by Burial 23 and is missing. The mandibular fragment was found over the innominate. *In situ* measurements: right femur length 410 mm, left tibia length 350 mm.

Age: 50 - 60 years (auricular surface morphology, dental wear and tooth loss).

Sex: Female (*os coxae* and infracranial morphology).

Stature: 154.7 ± 3.5 cms (5' 1") [left tibia].

Completeness: Partial infracranial skeleton and right half of the mandible. The mandible half is missing the condyle and the right canine. The infracranial remains are missing the left arm, scapulae, left clavicle, cervical and thoracic vertebrae, some carpals and hand phalanges, fibulae ends, some foot phalanges, most of the lumbar vertebrae, portions of the sacrum, and left femoral head.

Preservation: Good - Fair. The feet and mandible half are well preserved with very little weathering or breakage. The feet required no reconstruction. The long limb bones required reconstruction of the epiphyses. The *os coxae* were too fragmentary to reconstruct. Bone color is light reddish brown and bone is coarse to the touch. There is extensive cleaning damage to the proximal right femur below the greater trochanter which resembles rodent chewing but is freshly made.

Additional human remains: A very large proximal right radial shaft [doesn't go with Burials 31, 23 or 24]; left third, fourth and fifth metatarsals which were assigned to Burial 24.

Dental pathology: There is premortem loss of the mandibular right second and third molars and the third premolar. The third premolar and third molar sockets are partially filled in and remodeled. Wear of the remaining teeth exposes the dentin. There is slight calculus of the teeth and slight rolled rim and slight porosity of the alveoli.

Cranial pathology:

Skeletal pathology: The distal right radius has a healed fracture of the distal end just above the articular surface. There is 30° of angulation, apex dorsal. The cortical bone is completely remodeled with a slight residual ridging of bone across the shaft. There is an osteophyte of the posterior lateral shaft. The right distal ulna has a slightly flattened distal articular facet, and the styloid process is postdepositionally missing. Anterior-posterior radiograph of the radius documents a residual cortical layer extending inferiorly at the lateral margin of the distal end. There is slight sclerosis of the distal articular facet, and malalignment of the distal end. In the lateral radiograph, there is definite posterior progression of the distal fragment, with sclerosis of the anterior cortex, and a line of residual cortex visible along the posterior margin. The medullary cavity is completely restored in all views, suggesting the injury occurred well before death. The distal ulnar articular surface appears slightly blunted on the radiograph but there is no evidence of fracture. There is slight to moderate osteophytosis and porosis of the infracranial skeleton.

Noteworthy features: Patellar spurs, calcaneal spurs and squatting facets of the distal tibia and talus. The right calcaneus has a large shelf-like extension of the inferior medial tubercle. This tubercle provides attachment for the *adductor digiti minima*, *abductor hallucis*, *flexor digitorum brevis*, and is suggestive of excessive strain on the feet.

Comments: Aging: Auricular surface VII 50-60. Remains were assigned from bags as follows: Bag #996 [22-5-74 C5 SQs surface of layer 10] humeral fragment; Bag #1084 [30-5-74 C5 NW layer 11] right foot bones; Bag #1030 [25-5-74 C5 NW layer 10] seventh cervical vertebral body and left arch, two ulna shaft fragments; Bag #1128 [4-6-74 C5 NW layer 11] left lateral patella. Photographs: right ulna and radius, right calcaneus, mandible, *os coxae*. Radiographs: right calcaneus, right ulna and radius.

Burial No.: BC 32

Archaeological context: Early Period II, square C4, southwest quadrant, layer 13 to surface of layer 14, DBDP 2.04 m (femur), orientation unknown. Primarily disturbed long limb bones but burial is substantially incomplete, largely in baulk and probably disturbed by Burial 40. *In situ* measurement: left femur length 370 mm.

Age: Young adult (slight osteoarthritis).

Sex: ?Female (femoral head diameter).

Stature: 156.2 ± 7.3 cms (5' 1") [left femur].

Completeness: Three infracranial elements. The proximal right ulna, right tibia with the plateau in fragments and missing the malleolus, and left femur with the head and condyles in fragments, are present.

Preservation: Fair. The long limb bone shafts are in good condition but the cancellous bone is fragmented. The femoral head was reconstructed but could not be placed on the shaft. The bone is light tan with some grayish mottling, especially of the femur. The texture is coarse. There are insufficient fragments to complete reconstruction. There are fresh breaks for which there are no articulating fragments.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the left femoral condyles and the distal tibia.

Noteworthy features: Squatting facet of the distal right tibia.

Comments:

Burial No.: BC 33

Archaeological context: Early Period II, square C3, southeast quadrant, layer 8, DBDP 1.94 (skull), N 5°. Upper body and fragmentary skull of a supine burial, with the majority of the individual in the baulk.

Age: 45 - 50 years (dental wear).

Sex: Female (humeral size).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. The skull is represented by fragments of the frontal, left parietal, right temporal, right mandible with teeth *in situ*, right maxilla and loose teeth. The infracranial skeleton includes the bilateral humeral shafts, right glenoid and scapula fragments, left clavicle, fragments of the first cervical vertebra, right *ala* of the sacrum, trochlea of right ulna, right second, fourth, and fifth metacarpals, left patella, and right fourth metatarsal.

Preservation: Fair - Poor. The mandible is well preserved. The cranial vault is incomplete, weathered and fragmentary. The infracranial remains exhibit a variety of colors and conditions. The upper body is fragile, incomplete with no reconstruction possible. The bone is tan with some mottling. The lower bones are light beige in color.

Additional human remains: Right mandibular body with the first molar *in situ*, loose mandibular left canine and third premolar, loose maxillary molars, fragments of the parietals at the sagittal suture, right occipital, and right temporal [designated Burial 33A]. Left proximal femur fragments (?male), and a deciduous mandibular incisor [from Bag #1187].

Dental pathology: There is premortem loss of the mandibular second molar with healing of the alveolus. There is an abscess and reactive bone on the mandibular body below the first molar. Pitting hypoplasia is noted in the maxillary lateral incisor, mandibular canine and the third premolar, and occurred at ages 2.0-3.5 years and 4.5-5.5 years. Dental wear exposes the pulp in the molars, dentin in the anterior teeth. There is a large occlusal caries in the right mandibular third molar. Radiograph of the right mandible documents an apical abscess in the first molar socket.

Cranial pathology: There is thickening of the cranial vault and a coarse porosity of the superior frontal, occipital and parietal bones. Vault measurements at the bregma, obelion, and lambda range from 6 to 8 mm.

Skeletal pathology: Slight osteoarthritis with moderate bony nodules along the interface between the medial and lateral articular surfaces of the patella. The femur has a well marked oblique insertion anteriorly below the femoral head. The fourth metatarsal has an enlarged nutrient foramen on the medial surface just proximal to the midshaft.

Noteworthy features: Multiple mandibular foramina. Third trochanter of the left femur.

Comments: Remains retrieved from Bag #1213 [13-6-74 C3 SE level 9] include the left fourth and fifth metacarpals. Photographs: right fourth metatarsal, right mandible. Radiographs: right mandible, right fourth metatarsal.

Burial No.: BC 33A

Archaeological context: Sorted from Burial 33.

Age: Middle-aged (tooth wear).

Sex: Female (mastoid size).

Stature: Cannot be determined.

Completeness: Fragmentary skull. The right mandibular body with the first molar *in situ*. Loose maxillary left molars, mandibular left canine and third premolar, fragments of the parietals at the sagittal suture, right occipital, and right temporal at the asterion.

Preservation: Poor. Fragmentary and incomplete. No reconstruction possible. The bone varies in color from a whitish grey to a reddish brown. Bone texture is coarse, no reconstruction possible.

Additional human remains:

Dental pathology: Wear to the dentin in the molars. A large occlusal caries in the second maxillary molar. There is an even brown stain circumferentially on the maxillary molars.

Cranial pathology: The right mandibular fossa has moderate osteoarthritis.

Skeletal pathology:

Noteworthy features:

Comments:

Burial No.: BC 34

Archaeological context: Early Period II, square C3, southeast quadrant, layer 8, DBDP 1.85 (skull), N 6°. Burial badly disturbed with the lower skeleton in the baulk. Large crushed pot containing infant (Burial 34A) overlies the thorax area. *In situ* measurements: left ramus breadth 35 mm, nasal height 48 mm, nasal breadth 23 mm, upper facial height 63 mm, orbital breadth 39 mm, orbital height 34 mm.

Age: 40 - 45 years (cranial suture fusion, sternal rib end, dental wear).

Sex: Female (cranial morphology).

Stature: 153.5 ± . cms (5' ½") [left radius].

Completeness: Partial infracranial skeleton and moderately complete skull. The skull is missing the left mandibular condyle, left third molar and central and right lateral incisors, the maxillary left second and third molars, right occipital condyles, much of the left parietal, and sphenoid. Infracranial remains present include the right scapula, right clavicle missing the proximal end, humeral shafts missing the heads, radii, proximal and distal right ulnar fragments, right carpals, left metacarpals, right femur missing the distal end, right calcaneus, few ribs, thoracic and lumbar vertebrae fragments, and the left auricular surface of the *os coxae*.

Preservation: Fair. The cranial remains are fairly well preserved. The vault was reconstructed but did not retain the reconstruction. The face could not be restored to the vault. There are insufficient fragments to complete reconstruction of the vault. The infracranial remains are incomplete. Some reconstruction of the long limb bones was possible. The bone color is light tan with very little mottling; texture is coarse. The bones are light in weight and have no porcelain ring. There are insufficient fragments to complete reconstruction.

Additional human remains: Burial 34A.

Dental pathology: Premortem loss of the maxillary central incisors may have been deliberate (tooth ablation). The alveoli have completely resorbed. Extensive tooth wear with pulp exposure in the mandible and maxilla led to apical abscesses of the maxillary lateral incisors and left third premolar. Occlusal caries in the right mandibular third molar and the left second molar, and interproximal caries in the maxillary right second molar. Alveolar resorption is slight to moderate. Some very slight pitting hypoplasia in the maxillary and mandibular teeth, ranging over 2.0-5.5 years. Chipping of the maxillary and mandibular teeth.

Cranial pathology: Moderate osteoarthritis of the temporomandibular joint. Cranial thickness ranges from 6 - 10 mm. The right mandibular condyle is flattened on the lateral side.

Skeletal pathology: Slight osteoarthritis of the infracranial skeleton. Porosity and lipping of the right humeral head. Lipping of most of the articular surfaces. There is evidence of collapse of the disc in the lower cervical vertebrae in the form of lipping of the inferior facets.

Noteworthy features: Humeral facet of the scapula, multiple mandibular foramina.

Comments: Aging: Auricular surface V-VI 40-49; Sternal rib end V 40±12.22; Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. Remains added from Bag #1195 [11-6-74 C3 level 9 SEQ B. 33] include lumbar and thoracic vertebral fragments and the left auricular surface. Photographs: mandible and maxilla, temporomandibular joint. Radiographs: skull, left radius.

Burial No.: BC 34A

Archaeological context: Early Period II, square C3, southeast quadrant, layer 8. Remains from a large pottery vessel overlying Burial 34. Infant skeletal remains were noted on the field plan.

Age: 9 - 12 months (dental eruption).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Incomplete deciduous maxillary and mandibular teeth. The maxillary teeth include the left central incisor, lateral incisors and canines and the first molar. The mandibular teeth include the lateral incisor and first and second molar crowns. Cranial fragments, the right femoral midshaft, and a long limb bone fragment (?distal humerus) are also present.

Preservation: Poor. Only the tooth crowns are well preserved. The roots have broken and are weathered making it difficult to tell how much root has been developed.

Additional human remains:

Dental pathology: The tooth crowns exhibit brown staining on the labial and lingual surfaces. The ?erupted teeth (first incisor and lateral incisors) have white enamel with light brown stains. The unerupted teeth have brown stains of the entire crown.

Cranial pathology:

Skeletal pathology:

Noteworthy features:

Comments: Photograph: dental staining.

Burial No.: BC 35

Archaeological context: Early Period V/Middle Period VI, square C6, southeast quadrant, layer 14, DBDP 1.54 (skull), NW 303°. Supine, extended burial with disturbance of the left shoulder and thorax region. The majority of the lower skeleton lies in the baulk. Pot fragments over the shoulders and head.

Age: 40 - 50 years (ectocranial suture fusion and dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 163.6 ± . cms (5' 4½") [right humerus].

Completeness: Partial upper infracranial skeleton and partial skull. The skull is represented by the occipital missing the left condyle, right parietal, right temporal missing the superior portion, and the right and left halves of the mandible missing the coronoid processes and left ramus. Infracranial remains include the distal right clavicle, right scapula, right humerus, proximal ends of the right ulna and radius, the first five cervical vertebrae, the eighth through the twelfth thoracic vertebrae, some right rib heads, and rib body fragments.

Preservation: Good - Excellent. There is significant weathering of the cranial fragments with restoration of only the occipital and a portion of the right parietal. The mandible could not be restored. The cervical and thoracic vertebrae are well preserved and required minimal reconstruction. The clavicle could not be restored. The bone is light tan in color, deepening to brown in the thoracic vertebrae. Missing material is not present as fragments. The bone does not have a porcelain ring.

Additional human remains: None.

Dental pathology: Dental wear exposes the dentin in all teeth and the pulp in the first molars. The first molars are worn flat. There is slight porosity of the alveolar bone at the right fourth premolar. Moderate rolled rim is noted at the right second and third molar alveoli. Slight calculus in the posterior teeth.

Cranial pathology: There is slight osteoarthritis of the right occipital condyle. The vault fragments present do not appear thickened; measurements at the right parietal eminence, asterion, obelion, and lambda range from 5 - 7 mm.

Skeletal pathology: Slight osteoarthritis of the right arm skeleton. There is lipping and porosity of the lower thoracic vertebrae and some porosity in the cervical bodies. There is evidence of a loss of disc space in the eighth and ninth thoracic vertebral interspace with lipping of the facets.

Noteworthy features:

Comments: Aging: Cranial suture closure post. $\sum \geq 6$ $\geq 34.7 \pm 7.8$. Photographs: eighth and ninth thoracic vertebrae, dental wear, cervical osteoarthritis, and glenoid osteoarthritis. Radiograph: right humerus.

Burial No.: BC 36

Archaeological context: Early Period V, square C6, south quadrants, layer 15, DBDP 1.56 m (skull), NW 309° (corrected). Supine, extended child burial with lower legs in baulk. The upper body has been disturbed.

Age: 2 - 4 years (dental eruption).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Moderately complete infracranial skeleton and fragmentary skull. The skull is represented by loose maxillary and mandibular teeth, the anterior and lateral occiput, the orbital roofs, fragments of the vault, and the nearly complete right parietal. Infracranial remains include the femoral diaphyses missing the ends, the tibial and fibular diaphyses, ilia fragments, four vertebral bodies, some vertebral arches, left humerus fragment, and some rib fragments.

Preservation: Poor. The cranial remains are best preserved. Little reconstruction was possible. The teeth are missing the roots and are stained a dark reddish brown. The infracranial skeleton is missing most cancellous bone and all epiphyses. No complete diaphyseal length was obtained. The bone is beige in color and fragile.

Additional human remains: None.

Dental pathology: All of the deciduous teeth present have a light brown stain on the labial crowns. The permanent molar crowns are dark brown.

Cranial pathology: Cribra orbitalia is present bilaterally (diameter 0.2 mm) with no raised bone and no evidence of healing.

Skeletal pathology: None noted

Noteworthy features:

Comments: Problematic aging: measurements of the *pars lateralis* and *pars basilaris* suggest an age of three months, while dental formation and eruption suggest two years. The absence of any diaphyses complicates the aging estimate. Photographs: orbits, *pars basilaris*, tooth staining and tympanic ring.

Burial No.: BC 37

Archaeological context: Early Period V, square C6, northwest quadrant, layer 15, DBDP 1.55 (femur), WNW 289°. Supine, extended, lower leg bones. The remainder of the burial is in the baulk.

Age: Adult (epiphyseal fusion and size).

Sex: ?Male (infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary left lower leg. Fragments of the left tibial midshaft and proximal end, and the distal left fibular shaft are present.

Preservation: Poor. The tibial shaft required extensive reconstruction but the proximal portion could not be restored to the shaft. There is some weathering damage to the anterior spine. The bone is light beige in color and coarse in texture.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the left proximal medial tibial plateau.

Noteworthy features:

Comments: The excavation drawing shows distal femora should be present but no remains are identified in the laboratory.

Burial No.: BC 38

Archaeological context: Early Period II, square C3, southwest quadrant, layer 9, DBDP 1.92 m (skull), NNE 13°. Supine, extended, primary burial with a pot beyond the head and disturbance of the lower legs.

Age: 6 - 7 years (dental eruption and diaphyseal lengths).

Sex: ?Male (mandible and ilium morphology).

Stature: Cannot be determined.

Completeness: Moderately complete infracranial skeleton and moderately complete skull. The skull is missing fragments of the parietals, the left mastoid process, occipital condyles, sphenoid and much of the face, except the teeth. Infracranial remains are missing the right hand and most phalanges of the left hand, the patellae, tibiae, fibulae, feet, some of the vertebral bodies, and the sternal elements.

Preservation: Good - Fair. The cranial vault could not be restored although each bone was substantially reconstructed from small pieces. The mandible could not be reconstructed. Infracranial remains required some reconstruction. The *os coxae* elements are well preserved as are the ribs and lower vertebrae. The thoracic and cervical vertebrae are extremely fragmented. The long limb bone diaphyses of the arms are well preserved. Many of the epiphyses are missing. The bone color is light tan with some grey-black mottling. Bone surfaces are smooth in texture with small amounts of weathering on the extremities of the long bones.

Additional human remains: None.

Dental pathology: Wear of the deciduous teeth exposes the dentin on the two molars of both jaws. There is also slight calculus on these teeth. There is no hypoplasia in any of the teeth. There is slight brown staining on the maxillary deciduous first and second molars on the buccal surface.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features: The axis has just fused in the midline.

Comments: A permanent maxillary incisor and first molar were added from Bag #1201 [12-6-74 C3 SW level 9] Photographs: ilium, mandible, axis fusion.

Burial No.: BC 39

Archaeological context: Early Period V, square C6, southeast quadrant, layer 15-layer 16, DBDP 1.77 (pelvis), WNW 300° (corrected). Supine burial with arms at the sides; the skull, left arm and thorax are missing due to disturbance; the lower limb bones are in the baulk.

Age: 35 - 40 years (auricular surface morphology).

Sex: Male (*os coxae* morphology and infracranial bone size).

Stature: 167.2 ± . cms (5' 5¾") [segment measurement right humerus].

Completeness: Fragmentary infracranial skeleton. Present are the complete right clavicle, fragments of the right scapula, the right humerus missing the head, right proximal ulna and radius, three hand phalanges, nearly complete left *os coxae*, fragments of the right femoral midshaft and left femoral head, sternum, right rib head fragments, and lower thoracic vertebral arch fragments.

Preservation: Fair. There is recent breakage of the femoral shafts. Weathering of the left arm bones is extensive. There are insufficient fragments to reconstruct any long limb bone length. The clavicle is well preserved. The bone is light tan in color and coarse in texture with weathering loss of most cancellous bone. There are cleaning scrapes on the innominates and humerus. The left femoral shaft has fresh breakage but the femoral head does not.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: There is slight appendicular and vertebral osteoarthritis.

Noteworthy features: This is a robust male skeleton.

Comments: Aging: Auricular surface IV 35-39. Remains added from Bag #1209 [13-6-74 C6 SE layer 16 surface] hand phalanx and vertebral fragment; Bag #1276 [21-6-74 C6 SE layer 16] two hand phalanges.

Burial No.: BC 40

Archaeological context: Early Period II, square C4, southwest quadrant, layer 12 to the surface of layer 14, DBDP 1.96 m (skull), N 3° (corrected). Supine burial inside a large black pot. The cranium extended outside the pot, and the lower skeleton is in the baulk.

Age: 2 - 3 years (dental eruption, occipital).

Sex: ?Female (ilium morphology).

Stature: Cannot be determined.

Completeness: Partially complete infracranial skeleton and partial skull. The skull is missing the temporals, maxilla, left zygoma, most of the left parietal, mandibular condyles, and portions of the other cranial bones. The infracranial skeleton is missing the distal right clavicle, right humerus, most of the hands, the legs, and cervical vertebral bodies and arches.

Preservation: Excellent - Good. The cranial vault could not be reconstructed because of missing fragments. The mandible is well preserved. The ribs required reconstruction. The vertebral bodies and arches are well preserved. Bone color is orange-brown with very little weathering loss.

Additional human remains: None.

Dental pathology: There are bilateral semicircular defects of the mandibular canine labial crowns which include a depression of the enamel. There is wear to the dentin of the central incisors. The unerupted permanent tooth crowns are stained purple-brown.

Cranial pathology: cribra orbitalia of the left orbit, small holes (< 0.1 mm), but without evidence of raised porosity. There is evidence of healing on the lateral margin.

Skeletal pathology: None noted.

Noteworthy features: Multiple mandibular foramina on the left side.

Comments: Bag #1051 [28-5-74 C4 SWQ layer 11] contained the right frontal bone. Photographs: canines. Radiographs: left radius and left ulna, left humerus, mandible, and dental films.

Burial No.: BC 41

Archaeological context: Early Period I-II, square C6, southwest quadrant, layer 18, DBDP 2.06 m, E 90°. Disturbed burial consisting of skull and some upper body remains, with the majority of the skeleton in the baulk. *In situ* measurements: minimum frontal breadth 96 mm, upper facial height 66 mm, orbital height 34 mm, orbital breadth 41 mm, nasal height 44 mm, nasal breadth 28 mm, interorbital width 102 mm, alveolar breadth 69 mm.

Age: 35 - 40 years (ectocranial suture fusion, dental wear).

Sex: Female (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Fragmentary upper infracranial remains and moderately complete skull. The mandible is missing the right condyle. The cranium is missing the inferior parietals, the superior temporals, the inferior occipital except the condyles and the sphenoid body and wings. The infracranial remains are represented by the shafts of the right upper long limb bones, the left five metacarpal shafts, three right metacarpal shafts, proximal and middle hand phalanges, and fragments of the seven cervical vertebrae.

Preservation: Good - Fair. The mandible and maxilla are well preserved. The vault is extremely weathered with large perforations through the top and significant fragmentation. The face and posterior vault could not be reconstructed or restored to the vault. The vault appears very shortened and may be warped. The cancellous bone of the infracranial skeleton is weathered away. The bone is a light orange-brown in color, smooth in texture, and has a porcelain ring.

Additional human remains: None.

Dental pathology: There is moderate calculus on all teeth. There are slightly rolled rims in the second mandibular molar sockets. Dental attrition ranges from enamel loss in the posterior teeth to dentin exposure in the anterior teeth of both jaws. The mandibular left central incisor has a small notch in the occlusal surface. Third molar agenesis in the mandible is documented by radiograph. The left maxillary third molar is reduced in size.

Cranial pathology: Cranial vault thickness ranges from 4 - 6 mm.

Skeletal pathology: Slight lipping of the articular facets of the cervical vertebrae present.

Noteworthy features: Supraclavicular foramen of the right clavicle. Multiple mental foramina.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 4$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. A left medial hand phalanx added from Bag #1299 [20-6-74 C6 SWQ level 16/17]. Photographs: mandible, maxilla, supraclavicular foramen. Radiographs: mandible, cranial vault.

Burial No.: BC 42

Archaeological context: Early Period II, square C6, northwest quadrant, layer 17, DBDP 1.93 m (femur), SSW 203° (corrected). A disturbed burial with only the legs *in situ*. The mandible is inverted in the pelvic area. The feet are in the north baulk. A pot is found were the head should be.

Age: 3 - 5 years (dental eruption and long limb bone lengths).

Sex: ?Male (ilium and mandibular morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and mandible. The mandible is missing the anterior deciduous teeth and the left coronoid. The infracranial skeleton includes the femoral diaphyses, the arch of a vertebra, the left tibial diaphysis missing the ends, the left ilium, a fragment of the distal left fibular diaphysis, and the left humeral diaphysis.

Preservation: Good. The mandible is well preserved and reconstructed. There is weathering loss of the proximal femoral diaphysis. The bone is orange-brown in color, coarse in texture. There are insufficient fragments to complete reconstruction.

Additional human remains: None.

Dental pathology: Slight enamel polishing of the deciduous second molars. A light brown stain on the buccal surfaces of the deciduous first molars and the lingual surfaces of the second molars. The crypts of the mandible are surrounded by active, reactive bone growth which is not remodeled. The effect is bilateral which suggests that it may be related to tooth eruption but it is not noted in other individuals. On the right side the alveolus is incompletely resorbed with a small ridge still intact.

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments: Photograph: mandible. Radiographs: mandible (dental films), femur, humerus.

Burial No.: BC 43

Archaeological context: Early Period II, square C6, north quadrants, layer 18, DBDP 1.93 m (skull), NNE 15°. Extended, supine, primary burial, with hands crossed on the pelvis, pots overlying the pelvis and beyond the head, and disturbances at the right knee and left foot. Excavators note that Burial 43 was "buried with Burial 45." *In situ* measurements: minimum frontal breadth 106 mm, upper facial height 69 mm, orbital breadth 42 mm, orbital height 32 mm, nasal height 52 mm, nasal breadth 27 mm, interorbital breadth 104 mm.

Age: 35 - 40 years (ectocranial suture fusion and auricular surface morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 165.9 ± 5.4 cms (5' 4¾") [left femur].

Completeness: Moderately complete infracranial remains and nearly complete skull. The cranium is missing the right zygomatic process of the malar, fragments of the parietals at the posterior sagittal suture, and the mandibular incisors. Infracranial remains are missing the left clavicle, proximal left ulna, distal ends of the right arm bones, most carpals, metacarpals and phalanges, right patella, distal right femur, proximal right tibia, left tibia except the distal end, proximal left fibula, some metatarsals and phalanges, the cervical and first two lumbar vertebrae, and most of the lower ribs.

Preservation: Good. The mandible is completely intact. The cranial vault was extensively reconstructed with the face restored, but faulty reconstruction has left the frontal bone shortened. Bone color is a light tan with some black-gray mottling of the vault. Most long limb bones were reconstructed. There is both old and new breakage.

Additional human remains: Burial 43A.

Dental pathology: The impacted right mandibular third molar has an occlusal caries and resorption beneath the tooth crown. Wear exposes the dentin in all molars and premolars. Extensive wear, with pulp exposure, of the maxillary central and lateral incisors and canines. There is no abscessing. Calculus is moderate on the maxillary teeth. Linear hypoplastic defects in the mandibular canines occurred at age 4.0-4.5 years.

Cranial pathology: Premature fusion of the sagittal suture with anterior thickening and cresting along the suture line. The fusion extends from the area of the parietal foramen to the bregma. The cranial vault shape is not affected. The medial side of the left mandibular condyle is extremely enlarged with spurring and porosis of the extension, although there does not appear to be a fracture of the ascending ramus or mandibular body; the right side is normal in appearance. The left anterior mandibular fossa has moderate porosis. Cranial vault thickness measurements range from 5 mm to the obelion of 13 mm.

Skeletal pathology: Slight articular facet osteoarthritis in the lower thoracic and lumbar vertebrae. Laminal spurring of the thoracic and lumbar vertebrae. No osteoarthritis of the appendicular skeleton. The deltoid tuberosity and lateral supracondylar ridge of the distal humeri are well marked. The right clavicle has a small exostosis on the superior-anterior medial surface near the sternal end. The exostosis is solid cortical bone with a smooth transition to the clavicular shaft at the approximate insertion site of the *sternocleidomastoid* muscle. The anterior surface of the sternal end of the clavicle has a semicircular impression which is coarsely porotic in the base. This is not a rhomboid fossa. The defect appears to be an extension of the sternal articular surface.

Noteworthy features: Squatting facets of the distal tibiae and tali.

Comments: The left tibia is shown on the field drawings but is not found in the laboratory. The cranial vault is female in appearance but other sexing criteria indicate male sex. Aging: Auricular surface IV 35-39; Cranial suture closure post. $\Sigma \geq 3$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: clavicle, mandibular condyle and teeth, left temporomandibular joint. Radiograph: cranium.

Burial No.: BC 43A

Archaeological context: Early Period II, square C6, north quadrants, layer 17 and 18, DBDP 1.66 m (top of vessel containing bones). Remains from the pottery vessel overlying Burial 43.

Age: 3 - 6 months (occipital formation and dental formation).

Sex: Unknown. **Stature:** Cannot be determined.

Completeness: Fragmentary infracranial skeleton and fragmentary skull. The cranium is represented by the right maxillary deciduous teeth, the right maxilla, right petrous, right occipital and parietals. Infracranial remains include a fragment of the first cervical vertebra, bilateral rib fragments, left ulna missing the distal end, right femoral mid-diaphysis, right proximal tibial diaphysis, right fibular diaphysis, a scapular fragment, and vertebral fragments.

Preservation: Good - Fair. The skeleton is highly fragmentary with both old breakage and newer damage. The petrous fragment and tooth crowns are well preserved. Some reconstruction of the vault was possible but was not completely restored. The bone is light tan in color and coarse to the touch. The long bone diaphyses have suffered weathering damage to the ends so that none are complete.

Additional human remains: None.

Dental pathology: The tooth crowns are stained. The incisors have a light brown stain at the top separated by a white band then the lower crown is stained light tan. The canine and molar crowns are stained a darker reddish brown. The tips of the teeth are whitish in color.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features:

Comments: Photographs: dental staining, aging criteria.

Burial No.: BC 44

Archaeological context: Early Period I, square C6, northeast quadrant, layer 15 to surface of layer 16, DBDP 2.78 m (femur), N 10°. Supine, extended skeleton with three pots on the feet. The portion of the burial above the mid-femur is in the north baulk.

Age: 40 - 45 years (osteoarthritis).

Sex: Male (infracranial bone robusticity and size).

Stature: 165.1 ± 8.8 cms (5' 4¾") [segment measurement left tibia].

Completeness: Incomplete lower leg bones. Bones present include the left tibia and fibula missing the proximal ends, the right tibia and fibula missing both ends, the right foot missing the cuboid, third cuneiform, most of the ends of the metatarsals, and the distal phalanges, and the left foot missing the first cuneiform, the ends of the metatarsals, and the phalanges.

Preservation: Poor. The long limb bone shafts are fairly well preserved, although there is loss of the cancellous bone. There is weathering of the cortex of the right tibia. The bone is colored orange-brown and is coarse in texture. There is some blackening of the proximal and distal right tibia, the fibulae and the foot bones. The foot bones are less well preserved with marked erosion and porosity of all bones. Very little reconstruction was possible. The bone is not hardened and is very fragile.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the distal tibial and fibular facets, and the talar facets.

Noteworthy features: Squatting facets of the distal tibiae and talus. The tibiae are extremely flattened medial-laterally and are strongly marked at the insertion of the *soleal* line. This insertion appears to have pulled the tibial shaft posteriorly.

Comments: The field drawing documents the presence of femoral shafts but these are not identified in the laboratory.

Burial No.: BC 45

Archaeological context: Early Period II, square C6, north quadrants, layer 19, DBDP 2.19 m (skull), N 360°. Extended, supine, burial directly beneath Burial 43. Two halves of the same pot are found near each knee. The left shoulder and forearm areas are disturbed. Excavators note that Burial 45 was "buried with Burial 43".

Age: 18 - 22 years (pubic symphysis morphology, epiphyseal fusion, dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: 157.1 ± 3.0 cms (5' 2") [right femur].

Completeness: Partial infracranial skeleton and partial skull. The skull includes an intact face and maxilla, fragments of the parietals at the coronal and sagittal sutures, left temporal, and fragments of the occiput. The mandible is missing the condyles and anterior teeth. Infracranial remains are missing all but the first and second cervical vertebrae, ribs, left *os coxae* except the pubic symphysis, right scapula, right clavicle, ends of the forearm bones, humeral heads, left femoral head, left fibula, most of the tarsals, carpals, and left metacarpals.

Preservation: Good - Poor. The mandible was reconstructed from very weathered fragments. The cranial vault could not be restored. The right femur is complete. The pubic symphyses are intact and the face and dentition are well preserved. The left arm bones and face are colored yellowish tan and have a solid shiny appearance. All other bones are soft, coarsely textured, weathered, tan with black mottling. Extreme weathering of the feet, tibiae and right forearm bones. Weathering of all epiphyseal bone. There are insufficient fragments to account for the missing material.

Additional human remains: None.

Dental pathology: Enamel wear in most teeth, with dentin exposure in the mandibular first molars. There is slight calculus on the maxillary teeth. Slight calculus and slight alveolar resorption are noted in the posterior teeth and sockets of the mandible. There is a brown stain on the posterior maxillary teeth on the buccal and occlusal surfaces of the mandibular teeth.

Cranial pathology: Cranial thickness measured at the parietal eminence and frontal eminence ranges from 5 to 8 mm.

Skeletal pathology: Slight osteoarthritis of the radial head.

Noteworthy features:

Comments: Aging: Pubic symphysis Gilbert $\Sigma 0$ 16.0±2.82; Todd II 20-21; Suchey I 19.4±2.6. Two teeth and a left ulnar shaft fragment were added from Bag #1384 [18-7-74 NQs level 20]. Photographs: pubic symphysis, tooth wear, mandible. Radiograph: right femur.

Burial No.: BC 46

Archaeological context: Early Period II, B5/C5 baulk, layer 11, DBDP 1.66 m (pot). Burial in a large pot just above and to the east of Burial 47.

Age: 6 - 9 months (dental eruption).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary cranium and few infracranial remains. The cranial vault missing the left orbit, parietals and temporals, and a right deciduous maxillary incisor, are present. A single left rib head fragment, two thoracic vertebral arch fragments and a femoral diaphyseal fragment are present from the infracranial skeleton.

Preservation: Fair. The cranium is fragmented and incomplete. Reconstruction of the vault restored the superior frontal, right parietal and portions of the occipital. No reconstruction of the limb skeleton was possible. The bone is tan in color and coarse in texture. Most of the cancellous bone has been lost. There are insufficient fragments to complete reconstruction.

Additional human remains: None.

Dental pathology: The single deciduous incisor is stained reddish brown on both surfaces, although the lingual side is lighter in color.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features:

Comments: Age determination is difficult: the deciduous incisor crown is completely formed (9 mos) but there are no wear facets; the anterior fontanelle is open.

Burial No.: BC 47

Archaeological context: Early Period II, B5/C5 baulk, layer 13, DBDP 2.05 m (tibia), orientation unknown. Disturbed burial in a flexed, crouched position, with a pot over his head.

Age: 25 - 30 years (dental wear, sternal rib end morphology, ectocranial suture fusion).

Sex: Male (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and fragmentary skull. The skull is missing the center and ascending rami of the mandible, the superior frontal, occipital, inferior parietals, sphenoid and midmaxilla. Infracranial remains are missing the left scapula, left clavicle, left humerus, most of the hand bones, ends of the femora, patellae, ends of the fibulae, *os coxae*, vertebrae, and most ribs.

Preservation: Fair - Poor. The teeth are well preserved. The cranial vault and mandible could not be restored; all available elements are fragmented. There is great loss of all cancellous bone of the vertebral and appendicular skeleton. The right femur was minimally restored. The bone color is a mottled grey-black-white. The bone has a coarse texture and fragile surfaces. Portions of the mandible are hardened and slightly shiny with a greenish tinge.

Additional human remains: Possibly the left first toe proximal end which is reddish in color.

Dental pathology: Slight calculus on all teeth (although much is likely to have been chipped away). Dentin is exposed in the maxillary incisors and all first molars, otherwise only enamel attrition. There is brown staining on the occlusal surfaces of the maxillary left canine through the third molar.

Cranial pathology: The facial bones appear enlarged and thickened. Thickness measurements are: obelion (8 mm) and parietal eminence (5 mm).

Skeletal pathology: The tibiae are robust (>100 mm circumference at the nutrient foramina), as are the clavicle and forearm bones. Rib fragments have a swollen appearance, but with normal cortical surfaces. Radiograph of several rib fragments documents transverse striae in the medullary canal with a definite lack of cortex but with a small, i.e. not expanded, medullary canal. Slight osteoarthritis of the proximal left ulna.

Noteworthy features: This is the most robust individual of the 1974 Ban Chiang series. The tibia are columnar in appearance. There is no platycnemia.

Comments: Aging: Sternal rib end II-III 23-28; Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Radiographs: tibiae and ribs.

Burial No.: BC 48

Archaeological context: Early Period IIa, square B5/C5 baulk, surface of layer 13 to layer 14, DBDP 2.32 m (pelvis), NNW 340°. Primary, supine burial with disturbance of the left shoulder, upper chest and head, probably by interment of Burial 47. The pelvis is tilted laterally and the knees are flexed to the right.

Age: 35 - 45 years (auricular surface morphology, dental wear, osteoarthritis).

Sex: Female (cranial and infracranial morphology).

Stature: 153.3 ± 2.1 cms (5' 0") [right femur and tibia].

Completeness: Partial infracranial skeleton and fragmentary cranium. The cranium is represented by the left temporal missing the fossa and the zygomatic process, left maxilla from the lateral incisor to the fourth premolar, and two vault fragments. The infracranial remains include the left distal humeral shaft, *os coxae* fragments, femora, patellae, tibiae the left of which is missing the distal end, fibulae the left of which is missing the proximal end, feet missing the distal phalanges, some hand bones, lower thoracic vertebrae, fifth lumbar vertebra, and sacrum fragments.

Preservation: Good - Poor. The tibiae, fibulae and right foot are well preserved, intact, with little reconstruction necessary and little weathering. The femora have substantial weathering of the proximal ends and required extensive reconstruction of the distal half. The *os coxae*, vertebrae and carpals are poorly preserved with weathering loss and fragmentation. Bone color is tan to dark brown, mottled with black spots. The bone texture is coarse and slightly mineralized.

Additional human remains: A single permanent mandibular incisor with pulp exposure.

Dental pathology: Dental wear exposes the dentin in the premolars, lateral incisor and left canine. Slight calculus is noted on the teeth present.

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the femoral condyles, patellae and tarsals. Slight vertebral porosity. spondylolysis of at least the right superior facet of the fifth lumbar vertebra. The isolated superior right facet fragment has healed erosion of the *pars interarticularis*. The second or third proximal toe phalanx has a small depression in the dorsal portion of the proximal facet; the distal facet of the third metatarsal is not preserved. The radiograph of the right tibia shows reduced mineralization, reduced trabecular pattern in the interior, and a thin cortex suggestive of osteoporosis.

Noteworthy features: The bilateral navicular secondary ossification centers are unfused. The small, dime-sized tubercle-like piece of bone has a flattened, extended, and porotic surface where it articulates with the navicular. Squatting facets of the right tibia and tali.

Comments: Aging: Auricular surface IV-V 35-45. Photographs: left femur, spondylolysis, foot phalanx, left navicular and ossicle. Radiographs: left femur, right tibia, and right fibula.

Burial No.: BC 49

Archaeological context: Middle Period VI - VII, square B5/C5 baulk, layer 10, DBDP 1.42 m (lower legs), SSE 157°. *In situ* lower leg long bones extending through metal anklets. A large disturbance has removed the remainder of the skeleton.

Age: 4 - 5 years (diaphyseal length).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Incomplete lower leg bones and a deciduous maxillary incisor. The tibiae and fibulae diaphyses are missing all ends.

Preservation: Poor. The long limb bones cannot be reconstructed, and there are few fragments. There is a light green-blue stain on all bones at approximately the midshafts, otherwise the bone is mottled brown in color, coarse and fragile.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments: Fibula length is greater than 170 mm which suggests an age greater than 4 years.

Burial No.: BC 50

Archaeological context: Early Period V, square B5/C5 baulk, surface of layer 11, DBDP 1.68 m (ankles), NW 320°. Extended lower legs with the remainder of the skeleton in the unexcavated side wall. A pot is located beyond the feet.

Age: Adult (epiphyseal fusion). **Sex:** ?Male (infracranial bone size).

Stature: 165.6 ± 9.1 cms (5' 5") [segment measurement right tibia].

Completeness: Incomplete lower leg bones. Present are the distal shafts of the tibiae, distal left fibula, distal end of the right fibula, calcanea, right talus, cuboid, right metatarsals, left cuneiforms, the left fourth and fifth metatarsals, the shaft of the third metatarsal, and six foot phalanges.

Preservation: Good. Although incomplete, the bones present are well preserved with solid cortex. Bone color is beige with adherent grey-ashy matrix. No reconstruction is possible or required.

Additional human remains: None. **Dental pathology:** **Cranial pathology:**

Skeletal pathology: Slight osteoarthritis of the tarsals and metatarsals. Extension of the medial distal facet of the first metatarsal.

Noteworthy features: Squatting facets of the distal tibia and talus.

Comments: Bag #1599 [24-4-74 B5/C5 surface of layer 11] and Bag #1604 [26-4-74 B5/C5 surface of 11 Feature 1] are assigned this burial number.

Burial No.: BC 51

Archaeological context: Late Period X, square C6, northwest quadrant, layer 7, DBDP 0.62 m (long bone), E 80°. A single long bone fragment with an associated pot, extending from the west section south and parallel to BC Burial 1.

Age: ?Adult (infracranial bone size). **Sex:** ?Male (infracranial bone size).

Stature: Cannot be determined.

Completeness: Incomplete right tibial fragment from just below the nutrient foramen to the approximate midshaft.

Preservation: Fair. Incomplete bone fragment with a fresh break at the distal end.

Additional human remains: **Dental pathology:** **Cranial pathology:**

Skeletal pathology:

Noteworthy features: Fresh breakage at the midshaft suggests the bone was broken off at the baulk.

Comments: Not used in demographic analysis. Estimated midshaft measurements: anterior-posterior 20 mm, transverse 28 mm, circumference 70 mm.

Burial No.: BC 52

Archaeological context: Early Period II, C3/C4 baulk, layer 6, DBDP 2.10 m (femur), N 360°. Supine disturbed burial. As legs appear to be *in situ*, designated as Burial 52 by J. White in 1993.

Age: ?6 years (epiphyseal fusion). **Sex:** Unknown.

Stature: Cannot be determined.

Completeness: Incomplete lower leg long limb bones. Proximal ends of the tibiae and fibulae diaphyses are present. A fragment of the distal ?right femoral epiphysis is also present.

Preservation: Good. What is present is well preserved though incomplete. The bone color is tan with brown-grey mottling. The epiphyseal surface is partially present. There are both old, stained breaks and new excavation breaks.

Additional human remains: **Dental pathology**:

Cranial pathology: **Skeletal pathology:** None noted.

Noteworthy features:

Comments: Age estimated from comparing tibial shaft size with BC Burial 49.

Burial No.: BC 53

Archaeological context: Early Period V/Middle Period IV, square C3, north quadrants, layers 6?-7, DBDP 1.68 m (skull), SE/NW (laboratory determined). Fragmentary skull with vessel fragment from a down cut soil feature. Designated as a burial by J. White 1993.

Age: 2 - 4 years (slight wear on the deciduous molars). **Sex:** Unknown.

Stature: Cannot be determined.

Completeness: Fragments of a cranium. The left maxillary deciduous molar crowns, bilateral petrous portions of the temporal and some small cranial vault fragments are present.

Preservation: Poor. Very fragmentary. There are insufficient fragments to reconstruct the cranium. The tooth roots are broken off. The vault bones are fragile, exfoliating in thin layers, light tan in color. No piece is larger than a nickel.

Additional human remains: None.

Dental pathology: Slight enamel wear of the deciduous molars. **Cranial pathology:** None noted.

Skeletal pathology:

Noteworthy features: Carabelli's cusp on the left maxillary deciduous first molar.

Comments:

Burial No.: BC 54

Archaeological context: Early Period II, square C4, southeast quadrant, layer 11-12, feature 2, DBDP 1.76 m (skull), orientation unknown. Relatively complete skull in a highly disturbed area. Remainder of burial may be in baulk. Designated a burial by J. White 1993.

Age: 30 - 40 years (ectocranial suture fusion).

Sex: Male (cranial morphology).

Stature: Cannot be determined.

Completeness: Partial cranium. Present are the frontal missing the right zygomatic process, left parietal missing the inferior and anterior portions, right parietal missing most of the sutures, occipital missing the right condyle, and sphenoid body and horns. Most of both temporals are missing. A small fragment of the maxilla is present.

Preservation: Fair - Poor. Even after extensive reconstruction, the vault could not be restored. Some breakage is old and weathered while other breaks are fresh. The bone is light tan in color. There is considerable exfoliation of the interior of the cranium.

Additional human remains: None.

Dental pathology:

Cranial pathology: There may be slight cranial thickening but exfoliation of the interior vault clouds evaluation. There is a coarse porosis of the exterior of the superior frontal, superior occipital and superior parietals. The holes are healed and resemble depressions more than actual perforations. They do not occur below the level of the muscle attachment to the cranium. Cranial vault thickness measurements range from 4 - 7 mm. There is an apparent lytic defect of the left middle frontal (at the left eminence) which, under microscopic examination, appears to be an old weathered edge. There is no perforation of the inner table.

Skeletal pathology:

Noteworthy features:

Comments: Aging: Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$.

BAN CHIANG 1975 (BCES) BURIAL DESCRIPTIONS

Burial No.: BCES 1

Archaeological context: Late Period X^{+}, square D4, northeast quadrant, layer 7 to surface of layer 8, DBDP 0.96 (skull), S 178°. Supine, extended, primary burial with insect disturbances.

Age: 18 - 22 years (epiphyseal fusion, sternal rib end and auricular surface morphology).

Sex: Female (cranial and infracranial morphology).

Stature: 148.3 ± 5.6 cms (4' 10") [segment measurement right femur].

Completeness: Fairly complete infracranial skeleton and skull. The cranium is missing most of the mandible, the anterior maxillary alveolus and teeth, fragments of the right parietal bone, and the occipital condyles. The infracranial remains are missing the thoracic vertebrae, most of the cervical and lumbar vertebral arches, the left scapula, humerus, radius, ulna, and hand, most of the right carpals, ends of the right upper long limb bones, tibiae and fibulae ends, the metatarsals and phalanges of the feet, and much of the *os coxae*.

Preservation: Good - Fair. The cranium, except for the missing portions, is well preserved. All of the bones are variously mottled with grey dirt, black grey and tan coloring. Much of the cancellous bone is very weathered with loss of most of the vertebral bodies, *os coxae*, and scapula blades and epiphyses. None of the long bones could be restored to complete lengths, although some reconstruction was possible. There are insufficient fragments to complete reconstruction.

Additional human remains: Two parietal bone fragments which have a "porcelain" ring, an adult mandibular premolar with wear to the pulp.

Dental pathology: There is coarse porosis of the alveolar margin around the maxillary premolar and molar teeth. Calculus and alveolar resorption are slight in the maxilla. Dental attrition of the enamel is present in all teeth. Slight brown staining of the lingual surface of the maxillary left posterior third molar. Agenesis of the maxillary left third molar, while the right third molar is present but unerupted.

Cranial pathology: There is coarse cribra orbitalia which appears healed in both orbits. Cranial vault thickness ranges from 4 to 6 mm.

Skeletal pathology: None noted.

Noteworthy features: The proximal femoral shafts are flattened from the subtrochanteric area downward to about midshaft.

Comments: A large mammal bone and small pieces of pottery were recovered in the laboratory. Aging: Auricular surface I 20-24; Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: auricular surface, rib end and cribra orbitalia. Radiographs: cranium.

Burial No.: BCES 2

Archaeological context: Late Period X, square D6, northwest quadrant, layer 10, DBDP 1.13 m (skull), S 180°. Supine, extended primary burial, with the cranium turned to the left, the arms close to the trunk, and disturbances at the right foot and right knee. A clay roller and pottery were recovered from over and around the individual.

Age: 35 - 40 years (cranial suture fusion, sternal rib end, pubic symphysis).

Sex: Male (cranial and infracranial morphology).

Stature: 161.2 ± 4.2 cms (5' 3½) [left fibula].

Completeness: Moderately complete infracranial skeleton and partial skull. The cranium is missing the mandibular condyles, anterior right maxilla and posterior left maxilla, nasal bones, sphenoid, left parietal bones, occipital bone, portion of the right parietal bone and basiocciput. The infracranial remains are missing the right humeral head, distal right radius and ulna, all but one carpal and most metacarpals, right femoral head, right patella, tibial ends, most of the left and all of the right foot, ends of the right fibula, cervical vertebral bodies and arches, most thoracic and lumbar vertebral bodies, rib head fragments, right pubic symphysis, and most of the *os coxae*.

Preservation: Good - Fair. The cranium could not be restored. Cranial fragments are very weathered, whitish grey in color, and evidence of loss of the inner table. Color ranges from orange-brown to black. The left fibula is the only completely reconstructed long limb bone. Fragmentation of the *os coxae* and vertebrae prevented reconstruction. The upper limbs are better preserved. The ends of the long limb bones could not be restored.

Additional human remains: None.

Dental pathology: There is premortem loss of the mandibular right fourth premolar and right first molar, and the maxillary left first molar. Calculus is slight in all teeth. Abscessing of the mandibular right first molar socket which is resorbing; and of the apex of the mandibular right canine, and the maxillary right first molar with the teeth *in situ*. There is extensive coarse alveolar porosis of the maxilla and moderate rolled rim of the left mandibular first molar. There is pitted, hypoplastic enamel of the maxillary left canine, which occurs at age 3.0-3.5 years.

Tooth wear is irregular and extreme in some teeth. In the mandible, the second molars have wear to the dentin. The left first molar has a slope to the buccal side, the left third premolar and canine are worn down to the roots, while the left fourth premolar has a sloped wear to the dentin. The right second incisor is worn to the root as is the right third premolar. In the maxilla, the teeth on the left are worn to the roots, with pulp cavity exposure in the central incisor and the fourth premolar. There is a chip in the left canine medial surface. In the right maxillary teeth there is less wear from the canine to the first molar. The two premolars have dentin exposure, while the first molar is worn at a 20° slant with the buccal surface at the root level, and exposure of the pulp chamber. The crowns of both jaws are flat and smooth to the touch, and there are no striations identified on the occlusal surfaces under microscopic examination.

Cranial pathology: Cranial vault thickness ranges from 7 to 10 mm. The left maxilla seems thickened. There is no porosis of the frontal bone but preservation is only fair in the cranium.

Skeletal pathology: The right clavicle is flattened in the superior-inferior plane near the medial end. Cross-section of the bone at this point would be a thin, flat disc shape rather than an upright "O" shape.

There is no visible callus formation, angulation, or any other evidence of fracture Strongly marked muscle attachments of all bones. Slight to moderate osteoarthritis of the vertebral and appendicular skeleton.

Noteworthy features: Very robust male. The tibiae and femora are anteriorly bowed. The mandible is short and broad and very heavy. Sternal aperture. Agenesis of the left mandibular third molar documented on radiograph.

Comments: Aging: Pubic symphysis McKern $\Sigma 13$ 29.2±3.33; Todd V-VI 27-35; Suchey IV 35.2±9.4; Auricular surface IV 35-39; Sternal rib end V 33-42; Cranial suture closure post. $\Sigma \geq 4$ ≥34.7±7.8, ant. $\Sigma \geq 2$ ≥36.2±6.2. The left fifth metatarsal was assigned from Bag #496 [D6, NWQ, surface of layer 10, Feature 13, pot associated with Burial 2]. Fragment of the right radius was removed for DNA study (7.8 grams) in May 1990. Photographs: tooth wear, periodontal disease, clavicle, sternal aperture. Radiographs: left radius and ulna, mandible, clavicles.

Burial No.: BCES 3

Archaeological context: Late Period X^{+}, square D4, north quadrants, layer 7 to the surface of layer 8, DBDP 0.93 m (tibia), S 173°. Very disturbed, supine, primary burial. The lower leg long limb bones and a few vertebrae are *in situ.*

Age: Middle-aged (vertebral osteoarthritis).

Sex: Female (cranial and infracranial morphology).

Stature: 152.2 ± 5.4 cms (5' 0") [segment measurement right tibia].

Completeness: Fragmentary lower infracranial skeleton. The infracranial remains include the right third metatarsal, tibial shaft, fibular shafts, right patella missing the medial side, fragments of the right femoral condyle and tibial plateau, left rib ends, left radius, sciatic notch fragments, lower thoracic and upper lumbar vertebral arch fragments.

Preservation: Fair. The infracranial bone is brown-black in color with weathering loss of the cancellous bone. No complete long limb bone lengths could be restored. The bone is coarse to the touch. There are insufficient fragments to complete reconstruction.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: The proximal lateral right tibial shaft shows some thickening and appositional bone deposition between the nutrient foramen and the flare at the superior epiphysis and on the lateral border anteriorly to the tibial tuberosity. There is a small, inferiorly extending osteophyte on the lateral border at the level of the tibial tuberosity. Radiograph documents increases sclerosis of this area on the right tibia compared to the left but no evidence of fracture. The appositional nature of the bone is not demonstrated on the radiograph. The fibular shaft appears normal. Laminal spurring and moderate vertebral osteoarthritis is present.

Noteworthy features:

Comments: Photographs: tibiae. Radiographs: tibiae.

Burial No: BCES 4

Archaeological context: Late Period IX; square D6, southeast quadrant, layer 10 to the surface of layer 11, DBDP 1.34 m (skull), ESE 120°. Supine, primary burial.

Age: 9 - 12 months (dental eruption).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. The cranium is represented by bilateral petrous fragments, fragments of the occipital bone, frontal bone at the orbits, fragments of the frontal and parietal bones, and the left deciduous central and lateral incisors. The infracranial remains include the left distal humerus, right medial clavicles, left ulnar fragment, some hand bones, right femoral midshaft fragments, bilateral tibial and fibular midshafts, right talus, calcaneus, cuboid, two foot phalanges, five right and two left ribs, cervical and some thoracic arch fragments.

Preservation: Poor. Fragmentary and disturbed. No reconstruction possible. The cranial vault is in small fingertip-sized fragments. The cranium is grey-white with some black mottling and coarse in texture. The remainder of the bones are weathered. Most cancellous bone is lost. There are no complete diaphyses. The first cervical vertebra is well preserved. Bone color is brown.

Additional human remains: None.

Dental pathology: Two deciduous teeth are present. The maxillary deciduous lateral incisor is stained brown but the central incisor is white in color.

Cranial pathology: No apparent thickening or porosis of the cranial vault fragments.

Skeletal pathology: None noted.

Noteworthy features:

Comments: The petrous fragments appear too large for the infracranial remains and may belong to Burial 5.

Burial No.: BCES 5

Archaeological context: Late Period IX, square D6, southeast quadrant, layer 11, DBDP 1.39 m (skull), NW 320°. Supine, extended primary burial with ceramics over body.

Age: 5 - 6 years (dental eruption, diaphyseal lengths, epiphyseal fusion).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fairly complete infracranial skeleton and incomplete skull. The skull is represented by the mandible missing the right ascending ramus, the maxilla, basiocciput, one occipital and one parietal bone fragment. Infracranial remains include the right clavicle, scapula, humerus, radius, ulna and hand, the left femur missing the distal end, right foot, the right ilium, ischia, cervical vertebrae, the first eight thoracic vertebrae and the lumbar vertebrae, sacral elements, the left distal tibial end, and right rib fragments.

Preservation: Good - Fair. The cranium could not be reconstructed because of insufficient fragments and weathering damage. The right arm bones and *os coxae* are well preserved, intact with little weathering. The cervical vertebrae are also fairly well preserved with reconstructed bodies and arches. The ribs are extremely fragmentary and fragile. Bone color is mottled tan and grey-black and the texture is coarse.

Additional human remains: None.

Dental pathology: Attrition of the deciduous teeth exposes the dentin in the anterior maxillary and mandibular teeth. The permanent first molar does not show any wear.

Cranial pathology: None noted.

Skeletal pathology: The right third and fourth metatarsals have enlarged nutrient foramina.

Noteworthy features: The first cervical vertebra is not fused laterally on at least one side.

Comments: Four animal bone fragments were recovered in the laboratory. Photographs: ilium, mandible, pars basilaris, teeth, metatarsals. Radiographs: right ulna and radius, right humerus, dental films of the mandible and maxilla.

Burial No.: BCES 6

Archaeological context: Late Period IX, square D6, southwest quadrant, layer 12, DBDP 1.54 m (tibia), SE 142°. Supine, primary burial with the skull in the baulk and with disturbances at the knees. Pots over body, *bos* jaw just east of the burial, deer metacarpal on the west side, worked bone point east of the head of the left femur.

Age: 40 - 45 years (auricular surface morphology and sternal rib end).

Sex: Male (infracranial bone size).

Stature: 163.3 ± . cms (5' 4¼") [right humerus].

Completeness: Fairly complete infracranial skeleton and two teeth. The left mandibular central and lateral incisors were recovered. The infracranial remains are missing the first through the fourth cervical vertebrae, left scapula, left clavicle, left proximal humerus, most carpals, four metacarpals, distal hand phalanges, some thoracic vertebral arches and most bodies, the distal left radius and ulna, left femoral head, femoral condyles, patellae, right tibia and proximal fibula, proximal left tibia, half the tarsals, most metatarsals and all foot phalanges.

Preservation: Fair. The long limb bone shafts are well preserved, but there is extensive breakage and fragmentation of the *os coxae*, vertebrae and scapulae. The bone is light tan in color, mottled, black and brown. There is a black spot on the left femoral shaft. The long limb bones could be reconstructed, but much of the cancellous bone is lost.

Additional human remains: None.

Dental pathology: Dental wear exposes the dentin in the left mandibular incisors. There are small isolated pit hypoplasias of the central incisor which could not be measured.

Cranial pathology:

Skeletal pathology: Well marked entheses. There is slight to moderate osteoarthritis. Some vertebral facets are lipped and porotic, and one is eburnated. There is some collapse of the disc spaces evident by a rolling of the articular facets inferiorly.
Noteworthy features: The hand phalanges are curved in the dorsal-volar plane, and the right humerus appears to have a medial curve, perhaps the result of muscle use.

Comments: Robust male. Aging: Auricular surface V-VI 40-49; Sternal rib end V 38.8±7.0. A cranial vault fragment and a hand phalanx were added from Bag #741 [D6 SWQ Level 10]. The left navicular, and a proximal foot phalanx were added from Bag #602 [29-4-75 D6 SWQ layer 11], the left proximal third metatarsal was added from Bag #528 [D6 SWQ Level 10], three foot phalanges from Bag #602 [D6 SWQ level 10] and a proximal foot phalanx from Bag #741 [7-5-75 D6 SWQ Level 12]. Photographs: teeth, costoclavicular sulcus, humerus bowing, vertebral facets. Radiographs: right ulna and radius.

Burial No.: BCES 7

Archaeological context: Late Period X; burial spans from square D4, through baulk D4/D5 into square D5, southeast quadrant, surface of layer 13 to the surface of layer 14, DBDP 1.72 m (skull), S 170°. Supine, extended primary burial with multiple pots over the body, as well as an iron blade near the left proximal tibia, round iron object at the distal tibia, and two slag or laterite lumps in the middle of the tibia.

Age: 45 - 55 years (sternal rib end, dental wear, osteoarthritis).

Sex: Male (infracranial bone size and humeral head diameter).

Stature: 164.2 ± . cms (5' 4¾) [left humerus].

Completeness: Fairly complete infracranial skeleton and partial skull. Present from the cranium are the right and left mandibular bodies, missing the condyles; the right maxilla, right mastoid process, and fragments of the parietal and temporal bones. The infracranial remains are missing the left clavicle, sternum, distal right humerus, distal right radius, some carpals, right femoral head, distal end right tibia and shaft fragments, proximal fibulae, middle and distal foot phalanges, left distal tibia, lateral patellae, most ribs, most vertebral bodies and the cervical vertebral arches.

Preservation: Good - Fair - Poor. The cranial remains are poorly preserved with only a few bone fragments which are weathered and worn. No cranial bones could be reconstructed. The mandible is also extremely weathered and could not be restored. In the infracranial remains the upper limbs are well preserved, as are the foot bones. There is much weathering and fragmentation of the vertebrae and *os coxae*. Bone color is tan. There is some corroded metal stuck on the medial side of the distal left femur which is reddish green in color and has stained the bone. The femoral condyle fragments on this side are also stained reddish green as are the tibial plateau fragments. Some of the bones of the feet have a reddish stain. There is cleaning damage in the form of scraping marks on the left proximal femur and both femoral midshafts. No reconstruction of the *os coxae* and little of the vertebrae was possible. The distal humerus also has a reddish stain over the trochlea and capitulum. The posterior shaft of the right humerus at the level of the deltoid tuberosity has a large round reddish green stain. A single fragment of the cranial vault also has a black-green stain.

Additional human remains: An adult right clavicle, missing the sternal end, st smaller than Burial 7.

Dental pathology: Extreme dental wear with an irregular pattern. Pulp exposure in many teeth, chipped enamel, and irregular occlusal surfaces. Calculus is moderate on all teeth. There is premortem loss of the right mandibular second and third molars, secondary to abscessing, with incomplete remodeling of the sockets. Porotic alveolar bone is present at most sockets, and rolled rim at the left posterior molars. There is a grey-colored horizontal line across the maxillary right lateral incisor, which occurs at age 3.5-4.0 years.

Cranial pathology: A single thickness measurement made on the parietal bone has a maximum thickness of 11 mm. Porosis cannot be evaluated because of weathering.

Skeletal pathology: Slight to moderate appendicular and vertebral osteoarthritis with marked osteophytosis of the lower lumbar vertebrae. The left fifth metatarsal proximal articular facet is extremely porotic and eburnated, and all of the metatarsals have spicular entheses. A smooth-walled defect of the right first metatarsal proximal phalanx occurs on the inferior surface of the medial articular condyle at the edge of the articular facet. Another smooth-walled defect associated with expansion of the cortex occurs on the proximal end of the proximal phalanx of the right second metatarsal. The defect is associated with a small amount of reactive bone and expansion of the proximal articular facet. Well marked entheses of the upper and lower limb bones. The left hamate has a much smaller hook that the right hamate. There is no evidence of fracture of the carpals or metacarpals.

Noteworthy features: The right hand bones are considerably larger and longer than the left. The incompleteness of the long limb bones on the right side prohibits further documentation of this asymmetry.

Comments: Aging: Sternal rib end VI 50±11.2. Photographs: dental wear in the maxilla and mandible, vertebral osteoarthritis, hamates, foot bones, proximal femur, staining. Radiographs: left humerus, left radius and ulna.

Burial No.: BCES 8

Archaeological context: Late Period X, square D4, southwest quadrant, layer 11 to the surface of layer 12, DBDP 1.38 m (skull), S 174°. Supine, extended, primary burial with the head turned toward the left, with red-orange pottery over body. Articulated chicken bones are associated, along with four clay rollers found at the feet. A disturbance has removed the lower leg bones.

Age: 2 - 3 years (dental eruption, diaphyseal length, epiphyseal fusion).

Sex: ?Female (iliac morphology).

Stature: Cannot be determined.

Completeness: Substantially complete infracranial skeleton and skull. The cranium is missing portions of the left parietal and temporal bones, the left zygoma, nasal bones and small portions of the frontal bone. The left maxillary teeth are loose. The mandible is missing the condyles, coronoid processes, and the right deciduous canine. The infracranial remains are missing the left coracoid process, left distal femur, right tibia and fibula, the left tibia and fibula except the distal ends, most of the hands, the right foot, and the left fifth metatarsal and phalanges.

Preservation: Excellent - Good. The cranial vault could not be restored but the occipital and left parietal bones are complete. There is weathering loss of portions of the left parietal bone and the distal left femur. All of the ribs and nearly all of the vertebral bodies and arches are intact with very little weathering. The bone is light tan in color and coarse in texture. Reconstruction of some of the diaphyses was required.

Additional human remains: None..

Dental pathology: Attrition of the enamel in the deciduous anterior teeth. There is a slight light brown staining of the labial surfaces of the deciduous maxillary teeth.

Cranial pathology: There is reactive bone formation around the tooth crypts of the mandible and on the maxilla below the infraorbital foramen. The *pars basilaris* is porotic as is the suprameatal area of the left temporal bone.

Skeletal pathology: None noted.

Noteworthy features: Marked shovel-shaping of the permanent maxillary central incisors.

Comments: Photographs: ilium, *pars basilaris, pars lateralis*, mandible, maxilla. Radiographs: femora, ulnae and left radius, maxilla.

Burial No.: BCES 9

Archaeological context: Late Period IX, square D5, southwest quadrant, layer 12 to surface of layer 13, DBDP 1.46 m (skull), NE 40°. Supine, extended, primary burial with the legs, from the mid-femora, extending into the west baulk. Postholes disturb the upper thorax. Pots surround the body. The left scapula was found beneath the pelvic bones.

Age: 35 - 40 years (auricular surface, sternal rib end, cranial sutures).

Sex: Female (cranial and infracranial morphology).

Stature: 151.3 ± . cms (4' 11½") [left radius].

Completeness: Partial infracranial skeleton and calvarium. The calvarium includes the superior frontal bone, bilateral parietal bones, superior occipital bone and five loose teeth, including the right mandibular incisors, and the maxillary left canine, second and third molars. The infracranial remains are missing the left humerus and scapula, the seventh cervical vertebra, all of the right and most of the left ribs, the second through the eleventh thoracic vertebrae, the lumbar vertebral bodies, the fifth lumbar vertebra, sacrum, most of the hands, distal femora, tibiae, patellae and feet.

Preservation: Fair. The cranial vault was reconstructed. The cranial vault has some areas of exfoliation. Most of the diaphyseal bone was reconstructed. Much of the cancellous bone is weathered and worn. There are insufficient fragments to complete reconstruction. Bone color is light tan with some grey mottling and is of coarse texture. The femoral shafts have fresh breakage.

Additional human remains: None.

Dental pathology: The pulp is exposed in the maxillary second molar and dentin in the anterior mandibular teeth. Calculus is slight to moderate. The labial surface of the right mandibular lateral incisor is polished suggesting an overbite.

Cranial pathology: There is a single small defect (8 mm) of the right parietal bone next to the sagittal suture and posterior to the coronal suture. The defect, not more than 1 mm deep, is healed with a wrinkled texture in the interior. Cranial vault thickness measurements range from 7 - 10 mm.

Skeletal pathology: Slight osteoarthritis of the forearms, femoral heads and vertebrae.

Noteworthy features: The iliofemoral ligament attachment is well marked.

Comments: Because the scapula was out of anatomical position, the right scapula and clavicle were examined for mortuary cutmarks; none found. Aging: Auricular surface IV 35-39; Sternal rib end V 40.0±12.2; Cranial suture closure post. $\sum \geq 4$ $\geq 34.7 \pm 7.8$, ant. $\sum \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: auricular surface, cranial vault defect. Radiographs: left ulna and cranium.

Burial No.: BCES 10

Archaeological context: Middle Period VII, square D7, layer 19, DBDP 2.38 m (femur), S 174°. Supine, extended burial with the upper body in the baulk. A pot is broken over the feet.

Age: 17 - 19 years (epiphyseal fusion, sternal rib end).

Sex: ?Male (*os coxae* and infracranial morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton. The skull is missing except for a small fragment of suture. Infracranial remains include the left foot missing the navicular and the phalanges, the right first metatarsal and phalanges, tibiae, fibulae, patellae, femora, *os coxae*, sacrum, lumbar vertebrae and twelfth thoracic vertebrae, hands missing some carpals and phalanges, few ribs, radii, and ulnae, the left missing the distal ends.

Preservation: Excellent - Good. The femora and tibiae are well preserved as is the sacrum and vertebrae. The innominates were reconstructed. There is weathering of the ends of the forearm bones and the left foot bones as well as the pubic rami. Bone color is brown with some black mottling of the forearm and femora. There are areas of bone which are smooth and shiny, appearing polished, while other areas are coarse.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Laminal spurring of the lumbar vertebrae.

Noteworthy features: The long limb bones appear long and gracile. Squatting facets of the distal tibiae and left talus.

Comments: Aging: Auricular surface II 25-29; Sternal rib end I 17.3±0.5. The left patella and a cranial vault fragment were added from Bag #837 [square D7, layer 19, around burial]. Photographs: lumbar vertebrae, *os coxae*, sacrum. Radiographs: left tibia, left femur and left ulna.

Burial No.: BCES 11

Archaeological context: Middle Period VII, square D4, west quadrant, surface of Level 14, DBDP 1.80 (skull), probably S. Isolated cranium.

Age: Middle-aged (cranial suture fusion and dental wear).

Sex: Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Incomplete skull. The cranium is missing the left zygoma, the maxilla and all teeth, the left side of the frontal bone, the left posterior parietal bone, the occipital condyles, and the sphenoid body. The right half of the mandible is present.

Preservation: Good - Fair. The mandible half is well preserved. The cranial vault was reconstructed from fragments with incomplete restoration because of weathering of the suture lines. Much of the outer cortex has been lost to exfoliation.

Additional human remains: A right patella, right upper rib, third or fourth proximal hand phalanx, left maxillary fragment with two molars *in situ*, and a loose third molar.

Dental pathology: Premortem loss of the mandibular right third molar. Moderate calculus. Slight alveolar porosity at most of the mandibular tooth sockets. Moderate rolled rim at the right second mandibular molar. Attrition exposes the dentin in most teeth except the premolars which have enamel wear. Slight hypoplasia in the form of a horizontal groove is noted in the mandibular incisors and canine, occurring at age 3.0-3.5 years.

Cranial pathology: cribra orbitalia with moderate healing of the right orbital roof. The porosity is large and coalesced but not raised. Vault thickness from 5 - 7 mm. The outer table is too weathered to evaluate for porosity.

Skeletal pathology:

Noteworthy features: Multiple mental foramina, tympanic dehiscence. Counter-winging of the right mandibular lateral incisor.

Comments: Aging: Cranial suture closure ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: mandible. Radiographs: cranium.

Burial No.: BCES 12

Archaeological context: Middle Period VIII, square D4, northeast quadrant, layer 14, DBDP 1.78 m (skull), N 10°. Supine, extended, primary burial covered with potsherds. Bronze anklets.

Age: 9 - 12 months (epiphyseal fusion, diaphyseal lengths, dental eruption).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Nearly complete infracranial skeleton and partial skull. The skull is missing the maxillary anterior deciduous dentition, the left zygoma, the left mandibular ramus, *pars basilaris*, and fragments of the vault. The infracranial remains are missing the right scapula, most hand bones, and the right talus, calcaneus and metatarsals. Most epiphyses were recovered.

Preservation: Good. Reconstruction of the cranial vault was extensive and incomplete. The mandible could not be restored. The diaphyses are well preserved as are the vertebral arches, some bodies and ribs. The bone is coarse in texture, mottled dark brown, black and brown with a grey dirt adherent. Slight green-yellow stain on the lower tibiae and fibulae.

Additional human remains: None.

Dental pathology: There is a dark reddish brown stain on the unerupted deciduous molar crowns. The ?erupted maxillary incisors have a light reddish brown to tan stain on both the buccal and lingual crown surfaces.

Cranial pathology: There is no apparent thickening or porosity of the cranial vault. There is a coarse, light layer of "worm-like trails" on the interior of the frontal bone. Portions of the vault are dense bone while others are coarsely porotic.

Skeletal pathology: The right clavicle is more curved than the left. There is anterior-posterior flattening near the medial end of the right clavicle and an extension of the inferior border just distal to the midshaft. There are no signs of callus formation.

Noteworthy features: The anterior fontanelle and the frontal suture are unfused. This is a remarkably intact skeleton for its age.

Comments: Photographs: clavicles, skull vault bones. Radiographs: clavicles, tibiae, right radius and ulna, right humerus, left femur and left fibula.

Burial No.: BCES 13

Archaeological context: Late Period X, square D4, south quadrants, layer 14, DBDP 1.83 m (skull), S 180°. Supine, extended, primary burial with disturbance of the left forearm and left proximal femur. Multiple pots are found above the right side of the burial and a number of clay rollers alongside the left foot. A dog skeleton was with this burial.

Age: 12 - 18 months (dental eruption, diaphyseal length).

Sex: ?Male (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Substantially complete infracranial skeleton and partial skull. The skull is missing the ascending ramus of the mandible, the maxillary alveolus, most of the frontal bone, *pars lateralis* and *pars basilaris*, sphenoid, and superior temporal bones. The infracranial remains are missing the right clavicle, cervical vertebral bodies and arches, right radius, left forearm, metacarpals, left proximal femur, some right metatarsals, and the left talus.

Preservation: Good - Fair. The cranium is not well preserved, being reconstructed from many small fragments with restoration only of the area around the lambda. The bones are exfoliating and have weathering and black staining. The infracranial remains are better preserved but there is weathering loss of most cancellous bone. The superior left femur has a fresh break. The bone color is mottled tan. The vertebral bodies are fairly well preserved.

Additional human remains: None.

Dental pathology: The unerupted teeth are stained dark reddish brown with some of the crown tips colored white. The erupted teeth are stained a light tan on the labial surface.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features: The left humerus, which is complete, is very robust with a well marked deltoid tuberosity.

Comments: Bag #1052 [23-5-75 "human bone" square D4, south Quads, layer 14, Burial 13] placed here. Radiographs: right femur, left humerus, left fibula.

Burial No.: BCES 14

Archaeological context: Middle Period VII, square D7, north central area, layer 19, DBDP 2.44 m (skull), N 380° (lab corrected). Supine, extended, primary burial with disturbances of the left arm, lower legs, and the cranium. A bronze bracelet around the right elbow, a pig jaw over the pelvic area, and a sherd scatter overlies the burial.

Age: 12 - 18 months (dental eruption, epiphyseal fusion, diaphyseal length).

Sex: ?Female (iliac morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and skull. The skull is missing much of the frontal bone, all of the orbits, maxilla and maxillary teeth, right temporal bone, left zygoma, and the mandibular left ascending ramus and right molar area. Infracranial remains include the right clavicle, scapula, and humerus, the left radius and ulna, eleven right ribs, five left ribs, sternal bodies, left hand bones, *os coxae* elements, femoral diaphyses, five cervical vertebrae, twelve thoracic vertebral arches, four vertebral bodies, two lumbar vertebral bodies and a single arch, and some sacral fragments.

Preservation: Good - Fair. The cranial vault was reconstructed. There is postmortem deformation of the right parietal area with superior flattening. The mandible was reconstructed. There is weathering of most of the extremities of the long limb diaphyses and ribs. The right ilium is very weathered; the vertebral bodies and arches are well preserved but weathered. There is a green stain on the distal posterior right humerus, otherwise the bone is a uniform brown color and coarse in texture.

Additional human remains: None.

Dental pathology: The right deciduous canine is nearly peg-shaped with a very pointed cusp. This tooth is only partially erupted. There is a light brown staining of the erupted teeth on the labial and crown surfaces.

Cranial pathology: There is a small, smooth walled opening of the left occipital bone at the left asterion. The opening measures 5 mm in diameter on the outer cranial surface. On the interior of the cranium the defect is larger, 8 mm. The interior defect has the appearance of a crater, the opening is larger than the lip inside. There is no reactive bone formation on either cranial surface. The defect is contiguous with the suture.

Skeletal pathology: None noted.

Noteworthy features: Anomalous foramina in the *pars lateralis* at the posterior synchondroses bilaterally.

Comments: Photographs: mandible, cranium. Radiographs: left humerus.

Burial No.: BCES 15

Archaeological context: Middle Period VII, square D7, along east sidewall, layer 19, DBDP 2.47 m (tibia), N 10°. Lower legs extending from the northeast corner of the square, with disturbance of the right foot by insect burrows.

Age: Adult (epiphyseal fusion, osteoarthritis).

Sex: ?Female (infracranial bone size).

Stature: 158.0 ± 3.5 cms (5' 2") [right tibia].

Completeness: Incomplete lower legs. The patellae, tibiae with the left missing the distal end, fibulae missing the distal ends, and the left missing the proximal end, right calcaneal fragment, left calcaneus, left first and third cuneiforms, left fifth metatarsal, and proximal and distal phalanges of the left first metatarsal are present.

Preservation: Good. What is present is fairly well preserved. Portions of the tibiae are weathered away and lost. There are no fragments for the missing elements. The bone is uniformly brown in color and coarse in texture with some light grey mud adherent.

Additional human remains: Bag #1321 [BCES square D7, layer 19, surface of layer 20, "Burial 15 possible"] contains small fragments of the glenoid, *os coxae* fragments, proximal clavicle fragment, and do not seem to be associated.

Dental pathology:

Cranial pathology:

Skeletal pathology: There is a large exostosis (18 mm) extending from the medial side of the metaphysis of the left tibia distally and ending in a mushroom-shaped bulge. The end has a coarse, grainy appearance. The right tibia has a small spur of bone in approximately the same location. Possible osteochondroma. Slight osteoarthritis of the patella, distal tibia and fibula and tarsals.

Noteworthy features: Squatting facet of the distal right tibia.

Comments: Photographs: tibiae. Radiographs: left tibia, tibiae.

Burial No.: BCES 15A

Archaeological context: Unknown provenience. No burial recovered by archaeologists by this number.

Age: 40 - 45 years (cranial suture fusion and dental wear).

Sex: Female (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Partial upper infracranial skeleton and partial skull. The skull is represented by the mandible missing some teeth, the right frontal bone, the left parietal bone, the left temporal bone, most of the occipital bone, and fragments of the right parietal bone. The infracranial skeleton consists of the humeral heads, clavicles, scapulae, upper ribs from both sides, the cervical vertebrae, and the first eight thoracic vertebrae.

Preservation: Good. The mandible is complete except for some missing teeth. The cranium and mandible are mottled grey-tan and have a porcelain ring. Some weathering and old breakage is present, but there are fresh white breaks of the cranial vault bones. Reconstruction is incomplete. The infracranial remains are a light tan in color with some grey mottling. Bone texture is coarse. Little reconstruction of the infracranial remains was possible.

Additional human remains: None.

Dental pathology: Premortem loss of the mandibular right second and third molars, with incomplete resorption of the sockets. There is abscessing of the left mandibular second molar with premortem loss of the tooth. The root sockets are resorbed. Dental wear exposes the dentin in all teeth. Occlusal fissure caries of the left first molar. Slight rolled rim of the posterior tooth sockets. Calculus is slight in the posterior mandibular teeth.

Cranial pathology: Cranial vault thickness measurements range from 6-7 mm, but with no evidence of porosis. Both posterior condyles of the mandible have small, semi-circular impressions which follow the long axis of the condyle. On the right side the bottom of the defect (6 x 4 mm) is slightly porotic and may be eburnated, but preservation is only fair at this location. The left mandibular condylar defect (8 x 6 mm) is not as deep as the right, more like a "scoop." There do not appear to be changes in the temporomandibular fossa.

Skeletal pathology: Slight to moderate osteoarthritis of the long limb bones and vertebral skeleton.

Noteworthy features: Metopic suture, mylohyoid bridge, multiple mental foramina.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 5$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: cranium and mandible.

Burial No.: BCES 16

Archaeological context: Middle Period VII, square D7, layer 19, DBDP 2.56 m (skull), NNW 340°. Supine, primary burial interred adjacent to Burial 14. Pots are present along the right side of the burial, small anklets bilaterally, and a bracelet on the right wrist. There is disturbance of the right femur.

Age: 6 - 9 months (dental eruption).

Sex: ?Male (mandibular and iliac morphology).

Stature: Cannot be determined.

Completeness: Substantially complete infracranial skeleton and skull. The skull is missing the nasal region, the frontal bone at the coronal suture and the right supraorbital area, left zygoma, left parietal bone, maxillary deciduous central incisor, the ascending ramus and condyles of the mandible, and the mandibular deciduous incisors. The infracranial remains are missing the proximal left humerus, left radial mid-diaphysis, right femoral diaphysis, some metatarsals, ischia and right pubis, and some of the hand and foot phalanges.

Preservation: Good. The cranium is fragmentary and could not be reconstructed. There is weathering damage to some areas including the maxilla. Little reconstruction was required of the infracranial remains. Some weathering and fragmentation of the vertebral arches. The ribs are poorly preserved. The bone is brown in color, coarse in texture. There is a dark brown-green stain on the lower tibiae and fibulae, calcaneus, tali and the lower right radius and ulna.

Additional human remains: None.

Dental pathology: There appears to be some tooth crowding of the maxillary right incisors with the lateral incisor erupting in front of the central one. All of the unerupted teeth are stained a reddish brown. Some of the tips of the cusps are white in color. The erupted or erupting teeth are white in color with some staining of the surface of the enamel. The mandibular left central incisor has a circumferential reddish brown stain on the mid-crown. Perhaps this marks the point of eruption. The other teeth have small amounts of light brown staining of the interproximal area.

Cranial pathology: There is a coarse porosity of the *pars basilaris* and *pars lateralis* ectocranial surfaces and the suprameatal triangle near the mastoid.

Skeletal pathology: The tibiae have a "columnar" appearance. The bones are very stout and are missing the usual narrowing of the shaft near the distal end. The superior *linea aspera* at the third trochanter region of the left femur is extremely well marked with coarse bone spicules.

Noteworthy features: Unfused metopic suture, multiple mental foramina.

Comments: Photographs: radius and ulna. Radiographs: tibiae, left radius and ulna, right humerus, left femur, fibulae.

Burial No.: BCES 17

Archaeological context: Middle Period VII, square D7, central area, layer 19, DBDP 2.44 m, south orientation. Isolated fragment of a skull, heading south.

Age: Young adult (ectocranial suture fusion).

Sex: ?Female (cranial vault morphology).

Stature: Cannot be determined.

Completeness: Incomplete calvarium and mandible fragment. The calvarium includes the occipital bone missing the condyles, the parietal bones, the left temporal bone, and the left orbital area of the frontal bone. The mandible includes the left condyle and coronoid process, the body from the left fourth premolar to the right second molar with the right first and second molars *in situ*.

Preservation: Fair. The vault was reconstructed. There is some distortion of the right parietal bone. The fragments are mottled black and brown with some ashy grey areas. Most of the breakage is old. The mandible is tan in color. Both bones are coarsely textured and have a porcelain ring.

Additional human remains: None.

Dental pathology: Dental wear exposes the dentin in both molars present. There is premortem loss of the left first molar. The remainder of the mandibular teeth, except the right first and second molars, have been lost postmortem. Abscessing of the right canine socket has resulted in loss of the canine and lateral incisor interdental septum.

Cranial pathology: There is a fine porosis of the posterior parietal bones and superior occipital bones. The porosis appears healed under the microscope with most of the holes filled in. The left posterior parietal bone has the appearance of some layering of the cortical bone but it is well remodeled and may be postdepositional. There is thickening of the vault at the frontal bones and parietal bones which appears to be medullary in nature (5 - 7 mm), with one area of the frontal bone measuring 11 mm.

Skeletal pathology:

Noteworthy features:

Comments: Aging: Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. The right mandible fragment was intrusive in Burial 10 and is not the same color. The left mandible fragment was recovered by the excavators near the calvarium. Photographs: frontal bone thickening, right mandible. Radiographs: calvarium.

Burial No.: BCES 18: See Burial 72.

Burial No.: BCES 19

Archaeological context: Middle Period VII, square D4, southeast quadrant, layer 16 to the surface of layer 17, DBDP 1.98 m (skull), N 8°. Supine, extended, primary burial under a heavy sherd concentration. Mammal jaw bones were found to the right of the skull and the right hip.

Age: 30 - 35 years (cranial suture fusion, auricular surface morphology, sternal rib end, dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: 155.6 ± 2.1 cms (5' 1") [right femur and tibia].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing the body of the sphenoid, nasal bones, right maxillary incisors, and a portion of the right mandibular coronoid process. The infracranial remains are missing the right horn of the hyoid, manubrium, the carpals on the left side, some hand phalanges, much of the left iliac blade, pubic bones, left patella, the left third cuneiform, and most foot phalanges.

Preservation: Good - Excellent. The cranium required reconstruction of the face, which was restored to the vault, and the mandible was reconstructed at the midline and near the left first molar. The feet, hands, and lumbar and cervical vertebrae are well preserved. The long limb bones required some reconstruction and have weathering damage to the cancellous ends. The ribs and thoracic vertebrae are fragmented. The bone is uniformly brown in color, coarse in texture and has been scraped for cleaning.

Additional human remains: A large proximal right ulna (?male) and large right capitate (?male), both assigned to Burial 24, which was closely associated with Burial 19. A right mandible fragment with the second and third molars *in situ*.

Dental pathology: Calculus ranges from slight to moderate in both jaws. Dental wear has flattened the molar cusps and exposed the dentin in the incisors and first molars. Slight enamel hypoplasia in the form of small pits in the labial surface of the maxillary and mandibular canines, occurring around age 4 and 5 years. The left maxillary lateral incisor has a polished "facet" on the labial surface of the middle of the crown with a slightly concave surface. There is postmortem chipping of the right mandibular fourth premolar and first molar crowns. The left fourth premolar in the maxilla is also chipped. There is a brown stain splattered over the maxillary anterior labial and occlusal crowns.

Cranial pathology: Cranial thickness ranges from 8 to 9 mm in the parietal bones and at the asterion.

Skeletal pathology: Osteoarthritis ranges from none to slight in the appendicular and vertebral skeleton. The femorai shafts are bowed with the apex lateral. The first cervical vertebra has a small spurred notch at the left posterior lamina at the costal bar. A large preauricular sulcus is noted in the right *os coxae* suggesting childbirth.

Noteworthy features: One of the best preserved skeletons among the Ban Chiang series. Very gracile and small. Squatting facets of the distal tibiae and tali. The peroneal tubercles of the calcanei are huge. Multiple mandibular foramina on the right.

Comments: Mandible may be slightly narrow in reconstruction. Aging: Auricular surface III 30-34; Sternal rib end III-IV 23-28; Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: Radiographs: left tibia, right humerus, right radius and ulna, left fibula, right femur, cranium.

Burial No.: BCES 20

Archaeological context: Middle Period VII, square D4, northwest quadrant, layer 17 to the surface of layer 18, DBDP 2.09 m (skull), N 5°. Supine, extended, primary burial beneath a sherd sheet. The right side of the skeleton is missing due to grave cut of Burial 39.

Age: 35 - 40 years (ectocranial suture fusion, sternal rib end, dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: 156.7 ± . cms (5' 1¾") [left radius].

Completeness: Fairly complete left infracranial skeleton and left skull. The cranium is missing the right maxilla, right zygoma and some of the sphenoid. The mandible is missing the anterior and right body and ramus. Infracranial remains are missing the right ribs, right scapula, right clavicle, right arm, right hand, most of the sacrum, *os coxae*, femoral head, most of the right tibia, the proximal left femur, patellae, ends of the fibulae, left metatarsals and most foot phalanges.

Preservation: Good - Fair. The cranium was reconstructed but the face could not be restored. The frontal bone is weathered. The infracranial remains required reconstruction with good result, although many of the fragments are missing. The left sacrum and *os coxae* are very poorly preserved. The feet and hands are the best preserved elements. The bone is mottled black and tan; the feet have a pinkish cast.

Additional human remains: A child's mandible and left femur diaphysis [assigned to Burial 21]; and an adult maxillary premolar, complete left tibia, second cervical vertebral fragments, first and eleventh thoracic vertebrae, and a distal ulnar fragment.

Dental pathology: There is an occlusal caries of the mandibular second molar. There is linear hypoplasia in the maxillary and mandibular second molars, which occurs at 5 and 6.0-6.5 years. There is little alveolar disease. Extreme ?functional wear of the maxillary central incisors and the left lateral incisor, canine and premolars. Most of the crowns are worn away with pulp exposure of the central incisors and only roots remaining of the left lateral incisor. Agenesis of the maxillary left third molar documented by radiograph.
Cranial pathology: Slight cranial vault thickening without porosis. Cranial thickness measurements range from 5 mm at the lambda to 11 mm in the parietal bone.

Skeletal pathology: Slight to moderate osteoarthritis, especially of the right foot. There is moderate osteoporosis of the fifth and sixth cervical vertebral bodies, and osteoporosis and phytosis of the lumbar third and fourth bodies. Laminal spurring of the thoracic and lumbar vertebrae.

Noteworthy features: There are 11 pairs of ribs and 11 thoracic vertebrae. Squatting facets of the distal tibiae and tali. Apical process of the dens. Tympanic thickening.

Comments: Aging: Sternal rib end IV-V 27.7±4.6-40.0±12.2; Cranial suture closure post. $\Sigma \geq 3$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. The right distal ulnar fragment was assigned here from Burial 21, a right hand phalanx from Burial 15, and the distal right femoral shaft from Bag #1670. From Bag #1727 [section cleaning, square D4, WQ, "top of 1 to top of 19", 4-7-95], a right third metacarpal and a proximal right femur fragment which glues to this femur, other remains do not appear to match. Photographs: teeth, maxilla, cranium, foot bones, lumbar osteophytosis, cervical porosis. Radiographs: right radius, cranium, maxilla.

Burial No.: BCES 21

Archaeological context: Middle Period VI, square D5, southwest quadrant, layer 18 to the surface of layer 19, DBDP 2.30 m (skull), N 360°. Badly disturbed burial with only the skull and ribs *in situ*.

Age: 6 - 8 years (dental eruption and diaphyseal length).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. The skull includes the left mandible with the first molar *in situ* and loose central incisor, right maxilla with the first molar and unerupted second molar crowns, left zygoma, some vault fragments, and the temporal bones. Infracranial remains include the right femoral diaphysis, proximal tibial epiphysis, one thoracic vertebra, some rib fragments, right second metacarpal, and left humeral diaphysis fragment.

Preservation: Poor. The cranial vault fragments are small and weathered and little reconstruction was possible. The mandible fragment is well preserved. The cranial vault is colored tan with mottled black staining. The ribs are stained black. There is a single rib fragment with a greenish stain. All other bone remains are tan.

Additional human remains: None.

Dental pathology: Slight linear hypoplasia in the maxillary and mandibular left permanent first molars, which suggests physiological stress at ages 1.5-2.0 and 2.5-3.0 years. The deciduous teeth are worn to the dentin and the first permanent molars exhibit enamel wear. No caries or abscessing.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features:

Comments: Some infracranial remains are assigned here from Burials 20, 22, 23. Radiographs: mandible, right femur.

Burial No.: BCES 22

Archaeological context: Middle Period VII, square D4, central area, layer 17, DBDP 2.02 m (skull), N 7° (lab measured). Disarticulated and disturbed by Burial 26. Many potsherds surround the remains.

Age: Middle-aged (ectocranial suture fusion, dental wear).

Sex: Male (cranial morphology).

Stature: 170.1 ± 4.2 cms (5' 7") [left fibula].

Completeness: Fragmentary infracranial skeleton and nearly complete skull. The skull is missing most of the maxillary and mandibular teeth, the left mandibular condyle and both coronoid processes, sphenoid body and some of the superior right maxilla. The infracranial remains include the ulnae, right radius, right first, second and fifth metacarpals and two hand phalanges, left tibia, fibulae, tali, right calcaneus, left navicular, cuboids, right first through third metatarsals and proximal phalanges, the left third metatarsal, and the sacrum.

Preservation: Good. The right maxilla was reconstructed while the vault is complete. There is weathering damage to the mandible and maxilla. The skull is colored a grayish tan. Infracranial remains are well preserved but incomplete. The bone is grey-tan in color, uniform, with some cracking of the left ulna and weathering loss of the sacrum and proximal tibia.

Additional human remains: Subadult first proximal and distal foot phalanges assigned to Burial 26.

Dental pathology: Premortem loss of the mandibular central incisors, left lateral incisor, the maxillary left third molar and right third premolar. Slight to moderate calculus on the maxillary molars. Marked alveolar resorption in maxillary posterior tooth sockets. Abscessing of the maxillary left third molar, canine and central incisor and bilateral mandibular first and second molars and right canine. There is a large occlusal caries of the mandibular left first molar. Dental wear with pulp exposure of the maxillary premolars, mandibular canine, and first molars of both jaws. Dentin exposure in other teeth.

Cranial pathology: The left mastoid is extremely enlarged and expanded. In the frontal view the right orbit appears lower than the left, and the right zygoma appears flattened toward the face. There is no cranial vault asymmetry. Osteoarthritis of the temporo-mandibular joint is moderate because of the presence of two small circular porotic lesions of the fossae. Cranial vault thickness measurements range from 4 (parietal eminence) to 13 mm (lambda).

Skeletal pathology: The right second metacarpal has healed coarse porosis of the proximal articular surface and healing reactive bone of the distal shaft. The normal articular surface is no longer visible. In addition, there is healing reactive bone on the distal surface of the radius and fibulae. Moderate osteophytosis of the wrist, ankle and knee joints. Slight osteoarthritis is noted in the bones of the hands and feet. The medial tubercle of the calcaneus is extremely enlarged and extended anteriorly.

Noteworthy features: Very flared gonion of the mandible, very flat face and small nose. Robust skull. Double calcaneal facet. Squatting facets of the distal tibiae and tali. More extensive osteoarthritis than typical of other Ban Chiang burials.

Comments: Aging: Cranial suture closure post. Σ=3 34.7±9.6, ant. Σ=0 32.0±8.3. Dental age and osteoarthritis imply an older individual than the cranial suture aging. Bones from bag #1468 (Feature 1) are assigned here. The right first metacarpal, second metacarpal and two hand phalanges are assigned from Bag #1392 [16-6-75 D4, NEQ/SEQ Level 16 Feature 2]. Photographs: vault, mandible, right radius and calcaneus. Radiographs: left ulna and right radius, left fibula, cranium.

Burial No.: BCES 23

Archaeological context: Middle Period VII; square D4, northwest quadrant, layer 16, DBDP 1.97 m, N 352° (corrected). According to field records, disturbed burial consists only of distal upper limbs extending through bronze bracelets which are *in situ*.

Age: Adult (infracranial bone size).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Infracranial bone fragments. Present are the right ulna missing the ends, the left radius missing the ends, three right carpals, three phalanges, one lumbar vertebral arch, a right tibial midshaft fragment, and three foot phalanges.

Preservation: Fair. No complete long limb bone. The two toe phalanges are different colors. There are fresh breaks of the tibia and proximal ulna. The bone is light tan in color and coarse to the touch.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments:

Burial No.: BCES 24

Archaeological context: Middle Period VII, square D4, southeast quadrant, layer 17 to the surface of layer 18, DBDP 2.15 m (mandible), S 190°. Supine, extended, primary burial beneath Burial 19. The cranial vault is separated from the burial, probably by the later interment of Burial 19. The right clavicle and some ribs were found at the mid-femur area and the right forearm is disturbed. The lower tibiae and feet extend into the east sidewall. Potsherds are located over and along the left side of the burial and a bi-metallic spearpoint was found under the right arm.

Age: 30 - 35 years (auricular surface and sternal rib end morphology, ectocranial suture fusion).

Sex: Male (cranial and *os coxae* morphology).

Stature: 170.0 ± 4.5 cms (5' 7") [right tibia].

Completeness: Nearly complete skeleton and skull. The skull is missing the maxilla and anterior dentition, the left zygoma, nasal bones, sphenoid body and fragments of the left parietal and left temporal bones. The infracranial skeleton is missing the left scapula, second and fifth cervical vertebrae, right distal ulna, left radius, right *os coxae*, feet, proximal fibulae, right femoral head, distal femora, and most carpals and hand phalanges.

Preservation: Excellent - Fair. The mandible is perfectly preserved. The cranial vault has a weathering defect in the frontal bone with some exfoliation of the right zygoma and interior vault. The face could not be restored to the vault. The upper limbs are weathered and worn. The spinous processes of the thoracic vertebrae appear sheared off by weathering. No long limb bone is complete. There are insufficient fragments to complete the reconstruction. Bone color is brown. There is weathering of all cancellous bone.

Additional human remains: A subadult thoracic vertebra and scapula.

Dental pathology: Slight calculus on the mandibular teeth and the right maxillary molars. Rolled rim is moderate in the mandibular posterior teeth. Slight alveolar resorption is noted in the mandibular left fourth premolar and first molar. Pitting hypoplasia in the mandibular canines. Dental wear exposes the dentin in the first and second molars, while the anterior teeth have enamel wear. There is a reddish-brown stain on the buccal and occlusal surfaces of the maxillary molars.

Cranial pathology: The right mylohyoid groove and mandibular foramen have an interesting osteophytic bridge. At the superior-anterior margin of the foramen there is a small spur extending upward. A larger osteophyte extends downward from the lingula ridge. This is the attachment of the sphenomandibular ligament. Cranial vault thickness measurements range from 6 to 8 mm.

Skeletal pathology: There is evidence of lipping and "rolling" of the inferior facets of the first thoracic vertebra, the right inferior facets of the second and third thoracic vertebrae suggestive of loss of disc space. There is slight osteophytosis of most vertebrae and appendicular facets. The distal right medial border of the tibia has a large oval-shaped area (58 x 24 mm) of active periosteal bone growth. There appears to be a corresponding patch on the opposite side which may suggest post-depositional weathering. The right fifth metacarpal has a healed fracture of the proximal shaft just distal to the articular end. There is significant dorsivolar angulation (22°), apex dorsal. Laminal spurring is present in the thoracic and upper lumbar vertebrae.

Noteworthy features: Enamel pearl on the left mandibular second molar, costoclavicular sulci, enlarged suprascapular notch in the right scapula.

Comments: Aging: Auricular surface III 30-34; Sternal rib end IV 28.2±3.83; Cranial suture closure post. $\Sigma \geq 0$ $\geq$30.5±9.6, ant. $\Sigma \geq 0$ $\geq$32.0±8.3. The proximal right ulna and right capitate were sorted from Burial 19. Added from Bag #1021 [D4 SQ layer 14 Feature in pot B] is the right maxillary third premolar. Photographs: enamel pearl, mandible, right fifth metacarpal, scapula. Radiographs: left tibia, calvarium.

Burial No.: BCES 25

Archaeological context: Middle Period VI, square D5, southeast quadrant, layer 20, DBDP 2.53 m (tibia), S 170°. Extended, supine burial with disturbance of the upper body and upper legs. Pots are located to the left and beyond the lower legs, and potsherds are found in the chest area.

Age: Adult (epiphyseal fusion).

Sex: ?Male (infracranial bone size).

Stature: 162.8 ± . cms (5' 4") [right ulna].

Completeness: Fragmentary infracranial remains. Included are the right humeral midshaft fragment, right ulna, tibial shafts, including distal but not proximal ends; fibulae, missing the proximal ends; right patella, tali, right calcaneus, left first cuneiform, right navicular and a foot phalanx, the eighth through the twelfth thoracic vertebral arches, the first lumbar vertebra and two rib heads.

Preservation: Good - Fair. The foot bones are well preserved. The proximal tibia and fibulae are fragmented and weathered. There are insufficient fragments to reconstruct the missing portions of the skeleton. The bone color is tan with weathering damage to the anterior tibial borders and the tarsals. The vertebral bodies are weathered away. The rib heads are reddish-brown in color.

Additional human remains: Adult right maxilla with teeth *in situ*, right zygoma, complete right radius, left proximal ulna (?male), complete left femur, left femoral shaft and condyles, a vertebral arch, and a rib fragment.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the feet and lower leg bones. The left talus has a large osteophyte extending off the posterior medial border of the calcaneal facet. There is fusion of the superior facet of the tenth and inferior facet of the ninth thoracic vertebrae with loss of the articular surfaces. The fusion is well remodeled, and there is not copious bone growth. The pedicles are also fused.

Noteworthy features: Squatting facet of the left distal tibia and talus.

Comments: The right humeral shaft was added from Bag #1541 Feature 7. Photographs: talus, vertebrae. Radiographs: left ulna, left femur.

Burial No.: BCES 26

Archaeological context: Middle Period VII, square D4, southwest quadrant (predominately), surface of layer 19, DBDP 2.16 m (skull), S 174°. Supine, extended, primary burial beneath a sherd sheet. There are bronze and iron bracelets at both elbows and wrists. Burial 22 was disturbed by this burial.

Age: 3 - 5 years (dental eruption, diaphyseal length, epiphyseal fusion).

Sex: ?Female (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Nearly complete skeleton and moderately complete skull. The cranium is missing portions of the right frontal bone, right zygoma, most of the right maxilla, nasal bones, sphenoid body, right occipital bone, and right parietal bone. Infracranial remains are missing the distal left humerus, distal right radius and ulna, pubic bones, most carpals and metacarpals, right fourth and fifth metatarsals, lower thoracic and lumbar vertebrae, patellae, some lower ribs, and the sternal elements.

Preservation: Good - Fair. Reconstruction of the cranial vault is incomplete. Some reconstruction of the infracranial remains was accomplished. Weathering of most bones, including loss of the ends of most bones. The distal right humerus, distal left radius and ulna, and posterior lateral left ilium have green stains. The bone color is mottled black and brown.

Additional human remains: None.

Dental pathology: There are caries or hypoplastic defects of the deciduous canines of both jaws in the form of circular defects in the center of the labial surface of the crown. There is slight calculus on the deciduous maxillary teeth. Dentin is exposed in the posterior deciduous teeth of the maxilla.

Cranial pathology: cribra orbitalia of the medial fragments of the left orbit (holes greater than 0.5 mm) without fine raised reactive bone and with some smoothing of the margins. There is some coalescing to 1 mm holes. No cranial thickening. The single large fragment of the occipital bone has two small semi-circular depressions of the outer table. The bone is cortical, there is no reactive bone growth or porosity. Although the inner cranial table is eroded, the defects do not appear to penetrate to the inner table.

Skeletal pathology: None noted.

Noteworthy features: Carabelli's cusps of the deciduous second molars and the permanent first molars bilaterally.

Comments: The distal foot phalanges were sorted from Burial 22. Photographs: canines, maxilla, mandible, left humerus, radius and ulna, and ilium. Radiographs: femora, right humerus, tibiae, fibulae.

Burial No.: BCES 27

Archaeological context: Early Period V/Middle Period VI, D5, northwest quadrant, layer 21, DBDP 2.65 m (skull), N 355°. Supine, extended, primary burial, with the lower skeleton in the east sidewall. The cranium is cut by a posthole.

Age: 35 - 40 years (auricular surface morphology).

Sex: Female (cranial and *os coxae* morphology).

Stature: 157.7 ± . cms (5' 2") [right humerus].

Completeness: Nearly complete upper infracranial skeleton and partial skull. The cranium is missing the superior frontal bone, the parietal bones, and most of the occipital bone. The mandible is missing the right condyle. The infracranial remains are missing the distal clavicles, manubrium, right distal radius and ulna, right hand, right *os coxae*, femora, tibiae, fibulae, feet, sacrum, some ribs, some left carpals, most lumbar vertebral arches, and most sternal rib ends.

Preservation: Good - Fair. The face was reconstructed, the maxilla and mandible are best preserved. There are not enough cranial fragments to reconstruct the vault. The vertebrae are fragmented and weathered, especially the lower lumbar. The ribs could not be restored. The bone color is tan with some dark mottling of the *os coxae*. Most of the cancellous bone is weathered.

Additional human remains: Right proximal femoral diaphysis of a child.

Dental pathology: There are caries of the left mandibular second and third molars, the maxillary left first and second, and right second and third molars. Attrition has flattened all cusps with dentin exposure of the anterior teeth. There is no periodontal disease and little rolled rim in the posterior teeth.

Cranial pathology: A small (6 x 2 mm), circular, porotic lesion is noted on the posterior surface of the left mandibular condyle.

Skeletal pathology: Slight osteoarthritis of the vertebrae. Preauricular sulcus indicates childbirth. Slight osteoarthritis of the left hip.

Noteworthy features: Enlarged and ridged rhomboid fossa of both clavicles.

Comments: This mandible and maxilla were displayed in the traveling exhibition "Ban Chiang: Discovery of a Lost Bronze Age". Aging: Auricular surface IV 35-39. The right proximal radius and ulna were added from the section cleaning Bag #2310. Photographs: clavicles, mandible and maxilla. Radiographs: right humerus, left radius and ulna.

Burial No.: BCES 28

Archaeological context: Early Period V/Middle Period VI, square D5, southeast quadrant, layer 22, DBDP 2.78 m (skull), N 350°. Supine, extended, primary burial with disturbances at the left shoulder and right forearm. The lower legs and feet are in the baulk.

Age: 35 - 40 years (ectocranial suture fusion, auricular surface morphology and dental wear).

Sex: Female (cranial and infracranial morphology).

Stature: 150.0 ± . cms (4' 11") [right humerus].

Completeness: Partial infracranial skeleton and partial skull. The skull is represented by the right mandible missing the lateral condyle and the gonion, right mandibular teeth, maxilla and teeth, left frontal, left parietal, superior right parietal and right temporal bone. The infracranial remains are missing the left scapula and clavicle, left proximal humerus, right radius and ulna, distal ends of the left forearm bones, few carpals, the right metacarpals, most middle hand phalanges, the vertebral bodies, most of the ribs, tibiae, fibulae, feet, and most of the *os coxae* and sacrum.

Preservation: Fair. The cranial vault could not be restored because of insufficient fragments. There is distortion of the posterior parietals with forward flattening. The cranial vault is weathered and there is exfoliation of the bones. Most of the epiphyseal bone has been lost to weathering. The *os coxae* is fragmented. Vertebral bodies are weathered away. The left femoral shaft was reconstructed from many fragments. Bone color is brown with grey-black mottling; texture is coarse. There are insufficient fragments to complete reconstruction. Some of the maxillary anterior teeth are cracked.

Additional human remains: Right maxillary fragment which glued to the left fragment in Bag #1790 [D5, SEQ, layer 24].

Dental pathology: Premortem loss of the right mandibular canine and third molar. Dental wear exposes the dentin in the anterior teeth. There is chipping of the maxillary incisors, giving the arch an irregular look. Abscessing of the maxillary right second molar and left third premolar sockets. Healing of an abscess of the mandibular right canine socket with premortem loss of the tooth. Calculus is slight on the anterior teeth and moderate in the posterior teeth. Rolled rim and periodontal disease of the posterior tooth sockets. There has been chipping of the maxillary central incisors, left lateral incisor, and right premolars with smoothing of the chipped edges. The unopposed right maxillary third molar extends beyond the occlusal plane.

Cranial pathology: Cranial vault thickness ranges from 6 - 7 mm.

Skeletal pathology: Slight osteoarthritis of the appendicular and vertebral facets.

Noteworthy features: Multiple mandibular foramina, costoclavicular sulcus of the right clavicle; the deltoid tuberosities of the humeri are well developed.

Comments: Aging: Auricular surface IV 35-39; Cranial suture closure post. $\Sigma \geq 3$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. Photographs: maxillary tooth wear, mandibular abscessing, periodontitis.

Burial No.: BCES 29

Archaeological context: Early Period V/Middle Period VI, square D6, northeast quadrant, layers 23 and 24, DBDP 2.64 m (skull), NNW 340°. Supine, extended, primary burial with disturbance and displacement of the tibiae and disturbance with loss of the right forearm. Pottery over the left shoulder and beyond the feet, and a pig jaw at the left side of the feet.

Age: 18 - 20 years (epiphyseal fusion, sternal rib end and auricular surface morphologies).

Sex: Female (cranial and *os coxae* morphology).

Stature: 153.3 ± 2.1 cms (5' 0") [left bicondylar femur].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing the right and middle frontal bone, nasal bones, and right anterior parietal. Infracranial remains are missing the right radius and ulna, left radius, three carpals, sternum and manubrium, pubic symphyses, right talus and other small tarsals, the first through third metatarsals, the left navicular and three metatarsal shafts, and most foot phalanges.

Preservation: Excellent - Fair. The cranial vault is extremely weathered and exfoliating with some large perforations in the bone. The mandible is extremely weathered but was reconstructed. The vertebrae, sacrum, *os coxae*, and lower long limb bones are perfectly preserved. Little reconstruction of the ribs and vertebral arches was required. Bone color is light tan with some darker mottling of the sacrum and lower limbs.

Additional human remains: None.

Dental pathology: Slight rolled rim of the posterior mandibular sockets. Slight hypoplasia in the central maxillary incisors in the form of roughened enamel, which occurs at age 2.5-3.5 years. Attrition of the enamel in all teeth except in the lower molars where dentin is exposed. Slight calculus is present on the anterior mandibular teeth.

Cranial pathology: Cribra orbitalia is noted in the small fragment of the left orbit available for observation. There is a healed fine porosis (< 0.5 mm) of the cranial vault from the superior occipital to the anterior parietals. Cranial vault thickness measurements range from 4 - 8 mm.

Skeletal pathology: A preauricular sulcus is present in the left *os coxae* suggesting childbirth. Radiograph of a single rib, in a modified anterior-posterior view, documents a medullary canal with widened spaces between the trabeculae. The cortex is very thin. Possible changes related to anemia.

Noteworthy features: Winging of the left mandibular central incisor. The fourth premolars are reduced in size in both jaws. Multiple mandibular foramina. Four lumbar vertebrae appear to stack anatomically, and seem to match the twelfth thoracic vertebra; the fifth lumbar vertebra is missing (?congenital). Squatting facets of the distal tibiae and tali.

Comments: The skull is positively assigned because of excavator's note about the reduced fourth premolars. Aging: Auricular surface I ≤20-24; Sternal rib end II-III 17.4±1.5-22.6±1.7; Cranial suture closure post. Σ=0 =30.5±9.6, ant. Σ=0 =32.0±8.3. Photographs: aging criteria (rib head, clavicle epiphysis, *os coxae*), cranium, and mandible. Radiographs: rib, femora, fibula, cranium.

Burial No.: BCES 30

Archaeological context: Early Period V/Middle Period VI, square D6, northwest quadrant, layer 23, and D6/D7 baulk, layer 18 to the surface of layer 19, DBDP 2.38 m (tibia), NNW 345°. Supine, extended burial with disturbance of the left leg and hip, and the upper body. A small pot is found at the left hip area and towards the feet.

Age: 20 - 25 years (auricular surface morphology, epiphyseal fusion).

Sex: Female (*os coxae* morphology).

Stature: 152.5 ± 2.1 cms (5' 0") [right bicondylar femur].

Completeness: Partial right infracranial skeleton. The radius missing the head, hand missing some carpals and most phalanges, *os coxae* missing the pubic symphysis, femur, tibia, fibula, talus, calcaneus, cuboid, third cuneiform and four metatarsals, left fibular shaft, lumbar vertebrae, twelfth thoracic vertebra, and some rib fragments.

Preservation: Good. The long limb bones required minimal reconstruction. The lumbar vertebrae are well preserved with all processes intact. The fibulae are the least well preserved with weathering of the ends. Bone color is light tan. The femoral midshaft and lumbar vertebrae have a reddish brown color; the distal tibia is mottled black. The cortex is smooth in texture.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: The right femur is angulated 25°, apex anterior, at the proximal distal third of the shaft. There is well remodeled cortex in the area without thickening in the medial lateral direction, but there is a well demarcated ridge-like extension anteriorly, just above the lateral condylar line. The extension measures 10 x 56 mm and follows the long axis of the bone. The posterior intercondylar area has two raised (3 mm) osteophytes above the medial and central area of the condyle. There does not appear to be bone loss of the distal limb bones of the right side but the fibular midshaft measurement is 2 mm less than that on the left side. Possible well healed fracture of the distal femoral shaft with residual shortening and apex anterior angulation. The fifth lumbar vertebra is extremely compressed posteriorly and has a complete spondylolysis at the *pars interarticularis*. The exposed areas are not notably reactive. The left side has two osteophytic spurs while the right is a concave surface. A single inferior facet was recovered. The right first metatarsal has an enlarged and extended distal facet on the superior surface. The right proximal third metatarsal, medial surface, has a smooth-walled lesion at the edge of the facet for the second metatarsal. The interior of the lesion has trabeculae exposed which appear thickened and smoothed. There is no evidence of reactive bone. Slight osteoarthritis of the lumbar vertebrae.

Noteworthy features: The twelfth thoracic vertebra has lumbar morphology facets. Talar squatting facet.

Comments: Aging: Auricular surface I 20-24. Photographs: right femur, fifth lumbar vertebra, twelfth thoracic vertebra, first and third metatarsals, twelfth ribs, first lumbar vertebra. Radiographs: right tibia, right femur.

Burial No.: BCES 31

Archaeological context: Early Period IV, square D7 layer 24, and baulk D6/D7 layer 20, and square D6 layer 29; DBDP 3.06 m (skull), NW 315° (corrected). Supine, extended, primary burial with disturbance of the thorax and left upper arm.

Age: 45 - 50 years (auricular surface morphology, ectocranial suture closure, dental wear).

Sex: Male (skull and *os coxae* morphology).

Stature: 162.2 ± 4.1 cms (5' 3½") [left bicondylar femur].

Completeness: Moderately complete infracranial skeleton and skull. The cranium is missing five maxillary teeth, the left zygoma, sphenoid body, right occipital condyle, nasal bones, and three mandibular anterior teeth. The infracranial remains are missing most of the hands, the first, and third through the sixth cervical vertebrae, the third through the sixth thoracic vertebrae, the eighth, eleventh and twelfth thoracic vertebrae, the second lumbar vertebrae, most ribs, the right patella, right tibia, most of the smaller tarsals, metatarsals, and phalanges.

Preservation: Good. Some reconstruction of the face and vault, which is slightly flattened on the right posterior parietal, was required. The ribs and lower vertebrae required slight reconstruction. There are no fragments present for the missing material. The feet are weathered. The mandibular right fourth premolar and first molar have a rust colored stain on the buccal crown. The upper body bones are stained grey while the forearms and below are light tan in color. Bone cortex is solid and smooth in texture.

Additional human remains: A smaller left humeral shaft, grey in color; a large left radial shaft (?male) missing the ends, a left distal humeral shaft with fossa, a fragment of fibular shaft, both beige in color; right greater wing of the sphenoid; and the left mastoid portion of a temporal.

Dental pathology: Moderate rolled rim in the posterior mandibular alveoli. Resorption of the maxillary fourth premolar alveolus bilaterally. Wear exposes the pulp in the first molars and the dentin in all other teeth. There is chipping of the maxillary premolars and left canine.

Cranial pathology: Small circular depression (4 x 4 mm) in the right parietal, 20 mm posterior to the coronal suture and approximately at the midpoint of the parietal. The base of the lesion has fine porosis and is well healed. Cranial vault thickness measurements range from 5 - 7 mm.

Skeletal pathology: Predominately slight osteophytosis of the articular facets of the vertebrae, moderate porosis of the lower lumbar vertebral bodies. Slight osteoarthritis of the appendicular skeleton with moderate osteoarthritis of the left acromion-clavicular joint, right acetabulum and left patella. The left patella has an osteophytic nodule on the lateral portion of the medial surface near the superior edge. There is a large groove formed in the lateral edge of the right *os coxae* at the ischial spine. The groove runs obliquely from the superior edge laterally to the inferior edge posteriorly. The bone is impressed with some postdepositional weathering. The groove appears on the medial side of the *os coxae* beginning at the inferior terminus of the sciatic notch and separating the spine. There is no evidence of reactive bone. Possible perimortem trauma or infection.

Noteworthy features: Multiple mental and mandibular foramina of the left mandible. Winging of the mandibular central incisors. Suprascapular foramen of the right scapula. Squatting facet of the distal left tibia.

Comments: Aging: Pubic symphysis McKern Σ15 41.0±6.2; Todd X 50+; Suchey VI 61.2.±12.2; Auricular surface VI 45-49; Cranial suture closure post. Σ=1 =30.5±9.6, ant. Σ=0 =32.0±8.3. The cranial suture age (30 - 32 years) is much younger than the *os coxae* indicators (40 - 50 years). Photographs: right *os coxae*, right scapula, mandibular teeth, left patella. Radiographs: right humerus, right radius and ulna, left fibula, cranium, cranial lesion.

Burial No.: BCES 32

Archaeological context: Early Period V/Middle Period VI, square D5, southeast quadrant, layer 23, DBDP 2.81 m (vertebrae), S 175° (lab corrected). Supine burial with the head and lower body in the south and east baulks. There is disturbance of the right ribs and left lower ribs.

Age: Middle-aged (sternal rib end and osteoarthritis).

Sex: ?Male (humeral head diameter and clavicle length).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton. Present are the clavicles, left scapula, fragments of the right scapula, left proximal humerus, left distal ulnar shaft, left distal radius, left first and second metacarpals, four hand phalanges, 12 ribs missing the sternal ends bilaterally, the fourth, sixth and seventh cervical vertebrae, thoracic vertebrae, the first lumbar vertebra, left *os coxae*, proximal first metatarsal, and foot phalanges.

Preservation: Good. Although disturbed, the bone that is present is well preserved. The spinous and transverse processes of the vertebrae and the bodies are intact. The ribs are missing the sternal ends due to disturbance. Some reconstruction of the humerus and ribs was required. Bone color is uniformly tan; cortices are solid and smooth.

Additional human remains: Possible that the foot bones are intrusive.

Dental pathology:

Cranial pathology:

Skeletal pathology: Moderate osteoarthritis of the left glenoid, left clavicle and slight osteoarthritic changes at the left acetabulum. There is osteophytic growth along the anterior vertebral bodies from the fifth to the twelfth thoracic vertebrae. There is likely fusion of the sixth and seventh, and ninth and tenth thoracic vertebrae, but poor preservation complicates these observations. Radiograph of some of these vertebrae is not helpful, as it is difficult to get oriented. The inferior end-plate of the twelfth thoracic vertebra has a semicircular compressed area along the anterior edge. The compression is 2 mm lower than the remaining end-plate surface. Schmorl's nodes are present on the lower thoracic and first lumbar vertebrae. Laminal spurring of the thoracic vertebrae.

Noteworthy features: The anterior rim of the left acetabulum narrows down to a thin articular surface, called an incomplete acetabulum.

Comments: Eight grams of the right fifth rib were sent for DNA analysis (5-22-90) to Dr. Erica Hagelberg, Oxford University. The distal left ulnar shaft was added from BCES Burial 36. Aging: Sternal rib end V 38.8±7.0. Photographs: left acetabulum, vertebrae. Radiographs: vertebrae.

Burial No.: BCES 33

Archaeological context: Early Period V, square D5, west quadrants, layer 23, DBDP 3.06 m (skull), SSE 165°. Supine, extended, primary burial with disturbances of the left midfemur and right hand. A pottery vessel is located beyond the feet.

Age: 25 - 30 years (sternal rib end and auricular surface morphology, dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: 161.0 ± 3.5 cms (5' 3½") [left tibia].

Completeness: Nearly complete skeleton and skull. The mandible is complete; the cranial vault is missing portions of the inferior parietals, the occipital and the sphenoid. Infracranial remains are missing the sternum, blades of the scapulae, some carpals, distal and most medial hand phalanges, sternal rib ends, pubic rami of the *os coxae*, distal femora, proximal tibiae, ends of the right fibula, distal foot phalanges, and the bodies of the third and fourth lumbar vertebrae.

Preservation: Excellent - Fair. The mandible and the cervical and thoracic vertebral column are well preserved. Some small amounts of reconstruction were required. The upper body is much better preserved than the legs. The cranial vault was extensively reconstructed with severe weathering loss of the parietals, including exfoliation of the inner table. The face could not be restored to the vault and the reconstructed vault is shortened. The *os coxae* and cancellous bones of the legs are fragmented and weathered and could not be restored. Bone color in the lower legs is whitish beige. The vertebral column and upper limbs are tan-beige in color. Texture is coarse. There is a greenish stain on the labial crown surface of the mandibular incisors

Additional human remains: A single deciduous maxillary central incisor (?right).

Dental pathology: Impacted mandibular left third molar. Carious destruction of the maxillary third molars, roots only remaining, with abscessing of the right buccal roots. Abscessing of the mandibular third molars as well. Slight alveolar resorption and calculus present in both jaws. Dental wear just exposes the dentin in the first molars, other cusps are flattened. There is crowding of the left mandibular anterior teeth. Linear hypoplasia in the mandibular canines, right lateral incisor and right third premolar; which occurred at age 3.5-5.0 years. There is crowding of the left maxillary canine; the lateral incisor is located behind the canine and the central incisor.

Cranial pathology: Cranial vault thickening with some coarse porosis of the superior frontal and superior parietals, but weathering of the vault limits observations. The zygomas seem thickened as well. Cranial vault thickness measurements range from 5 - 12 mm.

Skeletal pathology: Slight osteoarthritic lipping of the vertebral articular facets with moderate changes in the left inferior and superior facets of the second and third thoracic vertebrae. Osteoarthritis of the appendicular skeleton ranges from none to slight. A preauricular sulcus is noted in the left *os coxae* and suggests childbirth. Laminal spurring is present in the thoracic and lumbar vertebrae.

Noteworthy features: Large teeth. Sagittal wormian bones. Multiple mandibular foramina. The acetabulum narrows as it proceeds inferiorly, an undeveloped acetabulum similar to BCES Burial 32.

Comments: Aging: Auricular surface II 25-29; Sternal rib end III-IV 22.6±1.7-27.7±4.6. Photographs: mandible, maxilla, second and third thoracic vertebrae, tenth rib head, tenth thoracic vertebra. Radiographs: left humerus, left ulna, left fibula.

Burial No.: BCES 34

Archaeological context: Early Period IV, square D6, northwest quadrant, layer 27, DBDP 3.01 m (skull). Upright, flexed burial with three pots in the grave.

Age: 25 - 30 years (auricular surface and sternal rib end morphology, dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: 157.7 ± 2.1 cms (5' 2") [left femur and tibia].

Completeness: Nearly complete skeleton and skull. The cranium is missing the left central frontal bone, nasal bones, and sphenoid body. The mandible is complete. Infracranial remains are missing the second cervical vertebrae, distal left radial and ulnar halves, distal right radial end, distal and middle phalanges of the hands, much of the sacrum, patellae, middle and distal phalanges of the feet, and some rib fragments.

Preservation: Excellent - Good. The mandible and facial skeleton required minimal reconstruction. The cranial vault was poorly restored, with warping of the right parietal at the temporal. The face could not be restored to the vault. Bone color is light tan with mottling of the cranium. Bone texture is coarse. Vertebral bodies are intact, and there is some loss of the thinner bones of the scapulae and *os coxae*. The sacrum is fragmentary. The remains have a porcelain ring. There is a blue-green stain on the mandibular incisors and the maxillary central incisors. There are insufficient fragments to complete reconstruction.

Additional human remains: One proximal hand phalanx, colored grey; a midshaft fragment of a humerus, colored orange-tan; and the right temporal of a child.

Dental pathology: Premortem loss of the maxillary right third molar with complete healing of the socket and loss of the mandibular left third molar with incomplete resorption. Occlusal caries of the mandibular left first molar. Slight rolled rim and periodontal disease of the posterior tooth sockets. Dental attrition of the enamel with slight dentin exposure of the maxillary central incisors. Calculus is moderate. There is chipping of the maxillary left premolars and right third premolar, and the mandibular left molars. Hypoplastic, coarse enamel occurs in the maxillary and mandibular canines at 4.0-5.0 years.

Cranial pathology: The mastoid processes are enlarged and inflated. There is a coarsening and depression of the cortical bone at the suprameatal triangle, with small smooth-walled openings penetrating the outer cortex. Radiographs of the mastoid processes documents pneumatization of both with uniform size and shape. Cranial vault thickness ranges from 4 - 9 mm.

Skeletal pathology: The left humeral medial epicondyle is split into two tubercles, separated by a deep groove. There is no sign of angulation or fracture of the distal epiphysis. Radiograph of the distal humerus documents the epicondyle has good cortical bone formation with no sign of fracture. Differential diagnosis includes possible epiphyseal fracture, or osteochondroma. Enlarged pubic tubercle of the left pubic symphysis and preauricular sulcus suggest childbirth. Appendicular osteoarthritis ranges from none to slight with moderate changes in the right sterno-clavicular joint. In the vertebrae, articular facets are slightly lipped, except in the twelfth thoracic and first lumbar vertebrae where changes are moderate. No porosis or osteophytosis of the vertebral bodies is noted. Laminal spurring of the thoracic and lumbar vertebrae. Enlarged nutrient foramen in the right fourth metatarsal.

Noteworthy features: Possible metopic suture. Rocker jaw. Squatting facets of the distal tibiae and tali. There is a superior facet bridge on the first cervical vertebra.

Comments: Aging: Pubic symphysis Suchey III 30.7±8.1; Auricular surface I-II 20-29; Sternal rib end IV 27.7±4.6; Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: maxilla, mandible, dental wear, left humerus, mastoid processes, pubic tubercle, metatarsal. Radiographs: maxilla, left tibia, left femur, calvarium, humerus, mastoids.

Burial No.: BCES 35

Archaeological context: Early Period IV, square D6, west quadrants, layer 27, DBDP 2.97 m (skull), NNW 328°. Supine, extended, primary burial with disturbance of the lower legs, and disarticulation of the thoracic elements.

Age: 45 - 50 years (articular surface, sternal rib end and pubic symphysis morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 166.4 ± . cms (5' 5½") [left humerus].

Completeness: Moderately complete infracranial skeleton and nearly complete skull. The skull is missing the body of the sphenoid and ethmoid bones. The infracranial remains are missing the sternum, the fifth cervical vertebra, many of the ribs, right carpal bones, right second and third metacarpals, left first metacarpal, most middle and distal hand phalanges, the lower femora, patellae, tibiae, fibulae, and feet.

Preservation: Excellent - Good. The cranial vault was incompletely restored; the vault is skewed at the left squamosal suture and the face was not attached. The long limb bones required little reconstruction; most cancellous bone is preserved. The lumbar vertebrae required slight reconstruction; otherwise other vertebrae are well preserved. The bone color is mottled tan and black. There is weathering loss of the sternum and *os coxae*. The bones have a porcelain ring.

Additional human remains: None.

Dental pathology: Premortem loss of the mandibular right molars, three incisors and the left second and third molars with incomplete socket remodeling. Premortem loss of the maxillary right canine, the alveolus is completely resorbed and remodeled. Interproximal caries in the left maxillary second and third molars. Wear exposes the pulp in the lower teeth and the dentin in the upper. Abscessing of the lower left premolar sockets. The alveoli has retracted from the canines in the mandible leaving the roots visible anteriorly. There is marked alveolar resorption in the upper posterior tooth sockets. There is chipping damage to many of the maxillary teeth. Sloping wear of the inferior premolars; high side lingual, low side buccal.

Cranial pathology: Cranial vault thickness measurements range from 5 - 8 mm.

Skeletal pathology: Well healed fracture of the proximal shaft of the left radius. The fracture occurs below the biceps tubercle by approximately 24 mm, and there is slight circumferential thickening of the shaft at this point. There is no remaining callus and all surfaces are smooth. There is angulation of the shaft, apex medial, of less than 10°. There doesn't appear to be a rotational deformity. The left ulna has no evidence of fracture but is considerably reduced in robusticity with a nearly round shaft and reduction of the interosseous crest. The left hand bones appear smaller in size than those on the right, as well the left humerus is more laterally bowed than the right, with no sign of a fracture, callus or other injury. There is no apparent rotational deformity. Radiograph of the humeri illustrates no pathological change. There is slight osteoarthritis of the majority of the appendicular skeleton with moderate changes in the left acromion-clavicular joint. Slight to moderate osteophytosis of the vertebral articular facets, and none to slight osteoporosis of the vertebral skeleton.

Noteworthy features: Short, round skull. Fusion of the hyoid left horn. Costal cartilage ossified. Multiple mandibular foramina.

Comments: Aging: Pubic symphysis McKern $\Sigma 15$ 41.5±6.22; Todd IX 45-50; Suchey V 45.6±10.4; Auricular surface VI-VII 45-60; Sternal rib end V-VI 38.8±7.0-50.0±11.17; Cranial suture closure post. Σ=3 =34.7±7.8, ant. Σ=1 =32.0±8.3. Photographs: mandible, maxilla, tympanic thickening, cranium, left radius and ulna, right arm, ossified hyoid, costocartilage. Radiographs: left humerus, right humerus, left radius, vault, humeri.

Burial No.: BCES 36

Archaeological context: Early Period V/Middle Period VI, square D5, southeast quadrant, layer 23, DBDP 2.98 m (pelvis), S 188°. Supine, extended burial with the head and neck in the south baulk and the feet in the east baulk. Disturbance of the right knee area and lower left leg. Underlying Burials 28 and 32.

Age: 45 - 50 years (auricular surface and pubic symphysis morphology).

Sex: Male (*os coxae* morphology, femoral head diameter).

Stature: 165.9 ± . cms (5' 5¼") [right ulna].

Completeness: Incomplete infracranial skeleton. Present are the radii, ulnae, hands, left superior patella, femora, right proximal tibial shaft and plateau, right fibular fragment, the ninth through the twelfth thoracic vertebrae, lumbar vertebral arches, sacrum, *os coxae*, and a few lower ribs.

Preservation: Fair. The only complete long limb bone is the right ulna; others could not be reconstructed. There are insufficient fragments to complete reconstruction. Significant weathering loss of all cancellous bone, especially in the *os coxae* and vertebral bodies. The carpals and upper limb bones are best preserved. There is old breakage of the distal tibia. Bone color is tan with some dark mottling of the upper limb bones. There is no porcelain ring in these remains. There is a green stain on the distal right trochlea and middle phalanx of the right hand.

Additional human remains: A distal left ulnar shaft fragment (placed with Burial 32); tibial plateau fragments.

Dental pathology:

Cranial pathology:

Skeletal pathology: The 200-mm-long right tibial shaft fragment, from the midshaft to the proximal metaphysis, exhibits active periosteal bone growth of the anterior-medial shaft. The unremodeled active bone deposition (53 mm x 22 mm), occurs at the distal end of the fragment (approximately midshaft). There are longitudinal striations of the medial tibial shaft. Viewing the fragment from the distal broken end, the compact dense cortex is visible with only a tiny outer layer of periostitis suggesting recent rather than ongoing infection. The area is localized and likely due to soft tissue injury. There is moderate osteophytosis of the vertebral column.

Noteworthy features: The first lumbar vertebra has a facet instead of a transverse process on the left side.

Comments: Aging: Pubic symphysis McKern $\Sigma 15$ 41.0±6.22; Todd X 50+; Suchey V 45.6±10; Auricular surface V 40-44. Photographs: right tibia, first lumbar vertebra. Radiographs: tibia.

Burial No.: BCES 37

Archaeological context: Early Period IV, square D6, southeast quadrant, layer 27, DBDP 3.03 m (skull), SE 145°. Skull and upper skeleton partially exposed along the east side wall. The skeleton was not fully recovered due to side wall collapse. Pot beyond skull.

Age: Adult (epiphyseal fusion).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragments of the infracranial skeleton. The left distal first metacarpal, proximal third metacarpal, shaft of the fourth or fifth metacarpal, left third metatarsal shaft fragment, left and right side of lumbar vertebral arch (?L-3), and a shaft fragment of an ulna are present.

Preservation: Poor. All remains are fragmentary. Some of the breakage is fresh and some is old. The vertebra and metacarpal fragments are stained black. The shaft fragments are tan in color and coarse in texture.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments: Excavators note extensive tooth wear, suggesting middle to old age.

Burial No.: BCES 38

Archaeological context: Early Period IV, square D6, southeast quadrant, layer 28, DBDP 3.15 m, SE 135°. Supine, extended, primary burial with a pot beyond the head and bronze anklets. There is a large disturbance of the lower legs and below the feet.

Age: 3.5 - 4.5 years (dental eruption, epiphyseal fusion, diaphyseal length).

Sex: ?Male (ilium morphology).

Stature: Cannot be determined.

Completeness: Substantially complete infracranial skeleton and nearly complete cranium. The skull is missing the mandible, the body of the sphenoid, and the maxillary left lateral deciduous incisor. The infracranial remains are missing the tibiae, fibulae, right tarsal, two left metacarpals, most phalanges, and patellae.

Preservation: Excellent. The cranial vault is warped at the right parietal, flattened inward and laterally, and could not be completely restored. All ribs and all vertebral bodies and arches are intact. The feet are less well preserved with breakage and weathering of the left tarsal and metatarsals. The scapulae blades are also fragile and broken. The tarsus of the left foot and the metatarsals of the right foot are stained greenish. Other bone color is tan with black mottling. There is a slight porcelain ring to these bones.

Additional human remains: None.

Dental pathology: Dental wear of the deciduous teeth exposes the dentin in the central incisors of the maxilla. There is a dark black stain on the occlusal surface of the maxillary deciduous molars and the buccal surface of the crowns of the second deciduous molars.

Cranial pathology: Cranial vault thickness measurements range from 1 - 4 mm.

Skeletal pathology: None noted.

Noteworthy features: The first cervical vertebra has not fused anteriorly or posteriorly although other cervical vertebrae are fused.

Comments: Photographs: first cervical vertebra, ilium, maxilla, *pars lateralis*. Radiographs: femora, left ulna and radius, left humerus, cranium, teeth.

Burial No.: BCES 40

Archaeological Context: Middle Period VII, square D4, south quadrants, layer 19, DBDP 2.39 m (skull), S 182°. Supine, extended primary burial beneath a sherd sheet. Skull partially in south baulk. A bronze bracelet is on the left forearm

Age: 45 - 50 years (cranial suture fusion, auricular surface and pubic symphysis morphology, and dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 169.8 ± 4.2 cms (5' 7") [right fibula].

Completeness: Nearly complete infracranial skeleton and moderately complete skull. The skull is missing the left half of the mandible and the right condyle, the left temporal, left parietal, left occipital, and the left zygoma. The infracranial remains are missing the manubrium, ends of the clavicles, much of the first two cervical vertebrae, most vertebral bodies, the right pubic ramus, five right carpals and the fifth metacarpal, two left cuneiforms, and some hand and foot phalanges.

Preservation: Good - Poor. Most of the left side of the skull is weathered and/or lost. There is pitting and exfoliation of the interior of the skull. The face could not be fully restored to the vault. Most of the bones of the skeleton required restoration. The vertebral bodies are weathered and missing, while the arches are well preserved. The ribs are missing the sternal ends due to weathering. The lower leg bones are well preserved. The left radius and ulna, and the left *os coxae* are stained green.

Associated human remains: Subadult cranial fragments (left temporal, left occipital condyle, and a vault fragment) aged 2 - 6 years.

Dental pathology: Extreme premortem tooth loss; all the maxillary posterior teeth and the mandibular right first and third molars are lost. Abscessing of the maxillary left third premolar socket extends into the maxillary sinus. Wear exposes the pulp in most teeth. There is a small interproximal caries in the right second molar. Alveolar resorption is moderate to marked. Slight to moderate calculus on most teeth. There is concave filing of the anterior crowns of the maxillary right canine and the maxillary central incisors. The filed area does not extend from the occlusal surface down to the root, but occurs at the middle of the crown. There is no evidence of striations across the tooth surface under the dissecting microscope. The canine also appears to have been polished on the anterior surface of the crown.

Cranial pathology: Cranial vault thickness ranges from 5 - 9 mm.

Skeletal pathology: Healed fractures at the apices of the left ?ninth, tenth and eleventh ribs. There is circumferential thickening of the ninth rib with a slight malalignment: the sternal end of the rib is shifted forward of the head fragment. The left tenth and eleventh ribs have less callus formation and are not displaced. The lower ribs are fractured slightly posteriorly of the apices, and there is posterior thickening of the eleventh rib and anterior thickening of the tenth. The right distal humerus has a flexion facet on the anterior shaft. A fragment of the first cervical vertebra including the dens facet is present; with extensive spurring of the superior facet. There is marked osteophytosis, osteoporosis and eburnation of the left facets of the third through the seventh cervical vertebrae, and all the lumbar facets are enlarged and buttressed. There is moderate degenerative change of the right ulna and marked osteoarthritis of the right femoral head and acetabulum. The right femoral head is circumferentially lipped with extension of the articular surface down onto the neck of the femur, nearly to the greater trochanter. There is a patch of eburnated bone on the femoral head (25 x 12 mm) on the anterior surface. The left acetabulum is ringed with osteophytic bone including the interior of the cup. The osteophytes nearly meet anterior to close the anterior-inferior rim of the acetabulum. There is a small area of eburnation indicating the chronic position of the head at the superior surface just below the anterior iliac spine. The left hip is only slightly osteoarthritic. The presence of asymmetrical advanced osteoarthritis suggests the etiology as traumatic, possibly associated with the rib fractures. Advanced osteoarthritis results in painful weight bearing and a subsequent limp. There is eburnation of the left fifth metatarsal proximal facet. The right tibial plateau has increased robusticity of the attachments of the knee ligaments and slight lipping of the medial plateau. Laminal spurring of the thoracic and lumbar vertebrae.

Noteworthy features: Metopic suture, asterionic bone, squatting facets of the distal tibiae and tali.

Comments: Aging: Pubic symphysis McKern $\Sigma 10$ 26.1±1.9; Todd V 27-30; Suchey III 28.7±6.5; Auricular surface IV 35-39; Sternal rib end IV 28.2±3.83; Cranial suture closure post. $\Sigma \geq 2$ ≥30.5±9.6, ant. $\Sigma \geq 1$ ≥32.0±8.3. Cranial suture, auricular surface morphology and pubic symphysis all age in the '30s, but tooth loss and wear and osteoarthritis suggest older age; have gone with late middle age on this basis. Photographs: ribs, vertebrae, right femur head, right acetabulum, left radius, left ulna, left *os coxae* staining; frontal bone, mandible and maxilla. Radiograph: tibia, right femur, right acetabulum, left ulna and radius.

Burial No.: BCES 41

Archaeological Context: Middle Period VII, square D4, southeast quadrant, layer 19, DBDP 2.26 m (knee), S 185°. Upper legs of a supine burial. The remainder of the skeleton is in the east and south baulks.

Age: Older young adult (osteoarthritis).

Sex: ?Female (femoral head diameter, infracranial bone size).

Stature: 151.7 ± 3.0 cms (5' 0") [right femur].

Completeness: Fragmentary right infracranial skeleton. Present are the right femur missing the greater trochanter and lateral condyle, distal right radius, right ulna missing the styloid process, four right carpals, five metacarpals, five proximal and three middle hand phalanges, and three left hand phalanges.

Preservation: Good. Minimal reconstruction of the femur was possible. There are no bone fragments for the missing material. Bone color is tan and texture is coarse. There is dark brown mottling of the distal right phalanges. There is a porcelain ring to the bone and very little weathering. The ends of the radius and ulna are freshly broken.

Associated human remains: Subadult rib, and left fourth metatarsal missing the head and blackened.

Dental pathology:

Cranial pathology:

Skeletal pathology: The hands and femoral head have slight osteoarthritic changes. The intercondylar notch has more extensive lipping and a smooth depression of the medial condyle which extends from the medial edge.

Noteworthy features: There is less than 10° of anterior femoral neck torsion; lateral bowing, as well as anterior- posterior bowing, are present in the femur. The proximal femoral neck entheses are strongly marked. There is a distal femoral squatting facet above the medial condyle.

Comments: Photographs: distal right femur squatting facet. Radiograph: right femur.

Burial No.: BCES 42

Archaeological Context: Early Period V, square D5, southeast quadrant, layer 25, DBDP 3.15 m (pelvis), N 350°. Supine, extended burial extending across the corner of square. The cranium and left upper body are in the east baulk and the lower legs are in the south baulk. Below Burials 28, 32, 36; possibly part of some complex.

Age: 40 - 45 years (auricular surface morphology).

Sex: ?Male (infracranial bone size).

Stature: 167.3 ± 8.3 cms (5' 6") [segment measurement right femur].

Completeness: Partial infracranial skeleton. Present are the right ulna and radius missing the distal ends, two right carpals and two metacarpals, most right hand phalanges, the left distal ulna, two left metacarpals and most left hand phalanges, the right femur missing the head, the left femur missing the proximal one-third shaft, the left auricular surface, patellae, and left proximal fibular shaft fragments.

Preservation: Good - Fair. The hand bones are well preserved but incomplete. The distal femoral condyles were reconstructed from many fragments. The radius and ulna could not be restored. There are insufficient fragments present to reconstruct missing elements. Bone color is tan, and bone has slight porcelain ring. The femora are slightly lighter in color. The left fibula fragments seem too small for this burial.

Associated human remains: Single middle hand phalanx.

Dental pathology:

Cranial pathology:

Skeletal pathology: Eburnation of the right radial head with lipping and buttressing of the articular surface. Slight osteoarthritis of the other joint surfaces. The increased osteoarthritis at the elbow suggests trauma, but the skeleton is too incomplete to fully evaluate.

Noteworthy features: Large hand bones.

Comments: Aging: Auricular surface V 40-44. Photographs: right radial head, right proximal ulnar fragment.

Burial No.: BCES 43

Archaeological Context: Early Period IV, square D5, east quadrants, layer 27, DBDP 3.38 m (skull), NNW. Calvarium only *in situ*. Very disturbed. Grave cut has four large disturbances and a single pot located at the right hip area.

Age: Newborn (*pars basilaris*, diaphyseal length).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and fragmentary skull. The calvarium is represented by portions of the parietals, frontal and occipital and a small fragment of the right mandibular body. The infracranial remains include the left scapula, left humerus missing the proximal end, two cervical vertebral arch halves, a single right rib, left femoral diaphysis, right femoral mid-diaphysis, left tibial diaphysis, and right tibial shaft fragment.

Preservation: Poor. Very incomplete, fragmented and weathered remains. The cranial vault bones were reconstructed incompletely from small fragments. No reconstruction possible on the infracranial remains. No fragments of the missing elements. The bone is tan in color and coarse in texture.

Associated human remains:

Dental pathology:

Cranial pathology: None noted.

Skeletal pathology: Cortical layering is evident on the femora and left tibia; an old cortical layer is covered by a new incompletely remodeled cortical layer which has a coarse appearance. The metaphyses do not appear to be involved but the preservation limits observations. Radiograph of the femoral and tibial diaphyses documents periostitis of the left tibial diaphysis and several incomplete Harris lines in the distal left femur. The lateral views document periostitis of the femora.

Noteworthy features:

Comments: Photographs: tibiae, femora. Radiograph: tibiae and femora.

Burial No.: BCES 44

Archaeological Context: Early Period III, square D5, northeast quadrant, layer 27, DBDP 3.70 m (skull), NNW 335°. Supine, extended burial with disturbance of the left side below the chest and the right lower leg and feet. Two pots at the foot of the grave. Directly over Burial 47.

Age: 2 - 4 years (dental eruption, diaphyseal lengths).

Sex: ?Female (mandible and iliac morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and partial skull. The cranium is represented by the left temporal, maxilla, left *pars lateralis*, and *pars basilaris*. The mandible is missing the right ascending ramus. The infracranial remains are missing the tibiae, feet, distal femora, two lumbar and three thoracic vertebrae, right hand, left humeral shaft, most vertebral bodies, sacral and sternal elements.

Preservation: Good - Fair. The left maxilla and mandible are well preserved but there are insufficient cranial fragments for the missing cranium. No reconstruction was possible. The infracranial remains are well preserved but have weathering of most diaphyses and cancellous bone. Reconstruction of some of the ribs was required. The midthoracic vertebrae are fragmentary; most vertebral bodies have been lost. Bone color is tan-grey and fairly uniform, with a porcelain ring.

Associated human remains: Subadult cranial vault fragments, three deciduous teeth, *pars basilaris*, left ilium, left ischium, two vertebral bodies and three cervical arch fragments (less than 6 years of age). An adult right zygoma and rib head subsequently assigned to Burial 45.

Dental pathology: Deciduous dentition is worn to the dentin in the maxillary incisors and to the enamel in all other teeth. The second molars are barely worn. There is dentin exposure on the lingual surfaces of the left maxillary incisors which appears to be wear rather than caries. No caries abscessing or hypoplasia. Slight orange-brown stain on the maxillary incisors and canine, occurring at the midcrown and extending across the tooth. The molar has a more diffuse stain.

Cranial pathology: None noted.

Skeletal pathology: Near fusion of the left lamina of the third and fourth thoracic vertebrae. There is substantial size difference between the clavicles which cannot be documented in the arm long limb bones.

Noteworthy features:

Comments: Photographs: third and fourth thoracic vertebrae, mandible, left ilium, maxillary teeth, clavicles. Radiographs: clavicles, dental radiograph of mandible.

Burial No.: BCES 45

Archaeological Context: Early Period IV, square D5, northwest quadrant, layer 27, DBDP 3.52 m (skull), NNW 334°. Supine, extended, primary burial with disturbances of the left arm and left feet. Pot over feet.

Age: 45 - 50 years (cranial suture fusion, auricular surface morphology, pubic symphysis morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 165.8 ± 4.5 cms (5' 4¾") [right tibia].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing the foramen magnum region of the occipital, the right lateral maxilla and the right mandibular condyle. Infracranial remains are missing the left humerus, radii, left ulna, sternum, manubrium, sternal rib ends, four vertebral bodies, a portion of the midshaft of the left femur, and a few hand and foot bones.

Preservation: Good - Fair. The skull vault is well preserved intact, except for the face and basiocciput. The mandible required reconstruction. The infracranial remains are fragmentary; where cancellous bone is present there is significant weathering of the feet, sacrum, *os coxae*, scapula blades. All long limb bones required reconstruction; and many are incomplete. Vertebral bodies are weathered, and ribs are fragmentary. Bone color is uniformly light tan, and bone has a porcelain ring.

Associated human remains: None.

Dental pathology: Premortem loss of the mandibular right third molar and fourth premolar, the maxillary right central incisor, left first molar, and bilateral second molars. Marked alveolar resorption of the maxillary anterior sockets and slight to marked resorption in the mandible. Huge occlusal caries are noted in the maxillary left second incisor, right first molar and the bilateral mandibular molars. Abscessing of the right maxillary premolars and first molar sockets, and the left lateral incisor socket resulting from tooth wear. Abscessing of the mandibular left first and second molar sockets, and the right second molar socket. Dental wear exposes the dentin or the pulp in most teeth. There is some chipping of the maxillary right third premolar and canine.

Cranial pathology: The right mastoid process is greatly inflated, without active bone growth or drainage cloaca. There may be some facial asymmetry. Radiograph of the mastoid processes documents two large open spaces in the right process, without sclerosis or evidence of increased density. There are small, multiple pneumatic spaces in the left mastoid process. Possible mastoiditis on the right side. The left posterior mandibular condyle has a semicircular impression of the articular facet with a slight porosis in the base of the defect. There is a slight porosis and expansion of the left temporomandibular fossa. Cranial vault thickness measurements range from 6 - 10 mm.

Skeletal pathology: There is a healed fracture of the anterior body of the left middle rib (exact number not known). There is circumferential callus formation with remodeling and some depression of the rib head fragment relative to the sternal fragment. The left twelfth rib also appears to have been fractured just distal to the rib head. There is thickening but no angulation. Marked osteoarthritis is found in the vertebral column, especially the lower thoracic and lumbar articular facets. The eleventh and twelfth thoracic vertebrae have fused at the posterior elements. The fusion is solid and coarse and there does not appear to be concomitant body osteophytosis. The articular facets are enlarged, expanded and coarsely spicular in all lumbar vertebrae. Laminal spurring is extensive in this area as well, resulting in some spinal stenosis. Radiograph of the thoracic spine shows fusion at the anterior longitudinal ligament giving a "layered" look to the anterior centrum. The appendicular skeleton has moderate osteoarthritic changes at the hip and knees.

Noteworthy features: Multiple mandibular foramina, spurring of the calcanea, enlargement of the medial calcaneal tubercle. Squatting facets of the distal tibiae and tali.

Comments: A rib end and the right zygoma were added from Burial 44. Photographs: left ribs, laminal spurring, lower thoracic vertebral fusion, left mandibular condyle, lumbar osteoarthritis, cranium, mandible, metatarsals, calcaneal tubercles, left mastoid process. Radiographs: vertebrae, mastoids, right humerus, right tibia, right radius and ulna, cranium.

Burial No.: BCES 46

Archaeological Context: Early Period IV, square D6, northeast quadrant, layer 29, DBDP 3.32 m (skull), SSE 151° (corrected). Supine, extended, primary burial with disarticulation of the spinal column, left upper arm, and right lower leg. A pot is over the ankles.

Age: 45 - 50 (auricular surface and pubic symphysis morphology, ectocranial suture fusion).

Sex: Female (cranial and infracranial morphology).

Stature: 151.5 ± 3.5 cms (5' 0") [left tibia].

Completeness: Moderately complete infracranial skeleton and substantially complete skull. The skull is missing the occipital bone around the foramen magnum, three mandibular incisors, the maxillary right anterior teeth, right third molar, and the left incisors and fourth premolar. The infracranial skeleton is missing the left humeral shaft, two metacarpals, most carpals and hand phalanges, patellae, most tarsals, two metatarsals, most foot phalanges, the third through the seventh cervical vertebrae, the first through the seventh thoracic and third lumbar vertebrae, sternum and manubrium, and most rib bodies.

Preservation: Good - Fair. The skull is well preserved. The mandible is complete except for the teeth. The face was reconstructed and affixed to the vault but the match was not good. The infracranial remains have much weathering of the cancellous bone especially the vertebrae, ribs, and epiphyses. Most bones could not be completely restored. Bone color is fairly uniform tan with some white areas from scraping and brown mottling. Bone texture is coarse. Added bones are grey in color.

Associated human remains: Two clavicular shaft fragments (?female): left distal end and a right clavicle missing the ends.

Dental pathology: Premortem loss of the maxillary right third premolar with incomplete healing. Moderate calculus on the maxillary and mandibular posterior teeth, moderate rolled rim of the mandibular left molar sockets. Periodontal disease is slight. Abscessing of the right mandibular first molar socket. Dental wear exposes the pulp in the anterior teeth and dentin in the posterior teeth. Small pitting hypoplasias of the mandibular canines.

Cranial pathology: Cranial vault thickness measurements range from 6 to 11 mm.

Skeletal pathology: Two of the middle left ribs have healed fractures of the apex. The fragments have circumferential thickening and anterior expansion at the apex. There does not appear to be any displacement. The area is well remodeled. Radiograph of these ribs documents healed fractures with some porosity of the ribs. Slight osteoarthritis of the appendicular and vertebral skeleton. There is moderate lipping of the proximal facet of the left second metatarsal. There is also moderate expansion of the proximal facet of a foot phalanx (?right second metatarsal proximal phalanx) with eburnation and sharpening of the lateral side of the auricular surface. There is laminal spurring of the vertebrae. Radiographs of the vertebrae document spinal stenosis with complete obliteration of the thecal canal with spurred bony growth, suggestive of possible neurological symptoms.

Noteworthy features: Metopic suture, lambdoidal wormian bones, third trochanter of the femora. The first cervical vertebra has small semicircular defects of the interior of the inferior facets to accommodate the dens. An epipteric bone on the right pterion. Accessory sacral facets. A preauricular sulcus indicates childbirth.

Comments: Aging: Pubic symphysis Gilbert Σ15 55.7±3.24; Todd IX 45-50; Suchey V 48.1±14.6; Auricular surface VI 45-49; Cranial suture closure post. Σ=4 =34.7±7.8, ant. Σ=2 =36.2±6.2. Photographs: skull, tooth wear, metopic suture, mandible, fractured ribs, sacrum, third trochanter of the femur, first cervical vertebra, left third metatarsal. Radiographs: right humerus, left radius and ulna, cranium, ribs, upper thoracic vertebrae.

Burial No.: BCES 47

Archaeological Context: Early Period III, square D5, east quadrants, layer 28, DBDP 3.80 m (skull), NNW 330°. Supine, extended, primary burial with the skull displaced slightly above the body. Burial beneath Burial 44, a child. A small pot found at the left side of the feet, two pots at the foot of the grave pit.

Age: 45 - 50 years (ectocranial suture fusion, sternal rib end and auricular surface morphology, pubic symphysis).

Sex: Male (cranial and *os coxae* morphology).

Stature: 166.8 ± 4.0 cms (5' 6") [left femur].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing the inferior nasal bones, tympanic margins, styloid processes, mandibular incisors, and hyoid horns. Infracranial remains are missing the distal left ulna, some carpals, most of the sternal rib ends, left proximal fibula, right navicular and cuboid, and most foot phalanges.

Preservation: Excellent - Good. The cranium is complete and intact, no reconstruction was required. The mandible was broken at the right ramus and midline and restored. There is postdepositional breakage of the crowns of the mandibular right incisors at the roots. The ribs, sternum, scapulae and *os coxae* were reconstructed. Most of the major upper long limb bones are complete, while the lower long limb bones are less well preserved. The feet are incomplete and weathered. Bone color is fairly uniformly tan with grey mottling. There is a semicircular deep brown stain on the right midcoronal suture of the cranium. The femora are slightly lighter in color. The matrix adhering to the bone is a hard grey mud which requires chipping to remove. There is a slight porcelain ring in all bones and some blackening of the ribs and right calcaneus.

Associated human remains: None.

Dental pathology: Dental attrition exposes the pulp in the maxillary teeth and the dentin in all other teeth. Tooth wear is even in both jaws. There is chipping of the premolars of both jaws. Slight to moderate rolled rim in the mandibular posterior alveoli and slight calculus on all teeth. The exposed dentin is stained black. Brown stain on the occlusal surface of the maxillary left second and third molars, the right premolars, and a small area on the mandibular left first molar occlusal surface.

Cranial pathology: Few cranial vault thickness measurements could be made, but the lambda thickness was 12 mm and the asterion 6 and 8 mm.

Skeletal pathology: The left ninth and tenth ribs have well healed fractures at the apex of the ribs. Callus is circumferential in both ribs. The angulation at the apex in the tenth rib is sharp, suggesting incomplete fracture of the posterior surface of the rib. Radiograph of the ribs documents complete remedullarization and complete remodeling of fractures. The right tibial tuberosity has an extended, grooved, ring of bone superior to the tuberosity and inferior to the epiphyseal surface. The tubercle appears to be raised off the surface of the bone. Possible Osgood-Schlatter's disease, or healed traumatic evulsion of the secondary ossification center. There is moderate osteoarthritis of the left first metatarsal. Slight appendicular osteoarthritis with asymmetrically greater osteoarthritis of the left knee, especially the medial side, suggestive of trauma. Slight osteoarthritis and osteoporosis of the vertebral skeleton with moderate osteophytosis of the second and third lumbar vertebral interface. Well marked proximal ulnar entheses.

Noteworthy features: Complete sacralization of the fifth lumbar vertebra, with *spina bifida* of the spinous process; mammillary foramina of the first and third lumbar vertebrae, epipteric bone, suprascapular foramen.

Comments: One of the best preserved skeletons of the Ban Chiang corpus. Aging: Pubic symphysis McKern $\Sigma 14$ 35.8±3.89; Todd VIII 39-44; Suchey V 45.6±10.4; Auricular surface VI 45-50; Sternal rib end V-VI 38.8±7.0-50.0±11.7; Cranial suture closure post. $\Sigma=11$ =39.4±9.1, ant. $\Sigma=2$ =36.2±6.2. Photographs: sacrum, third lumbar vertebra, cranium, maxilla, mandible, scapula, ribs. Radiographs: ribs, right humerus, left radius, right tibia, left tibia, right fibula, left femur, cranium.

Burial No.: BCES 48

Archaeological Context: Early Period IV, square D6, southwest quadrant, layer 28, DBDP 2.99 m (pot), NNW (pot). Pot burial disturbed at the bottom and the side. The skeletal remains were somewhat disarticulated.

Age: Newborn (diaphyseal length and *pars basilaris*).

Sex: ?Female (right iliac morphology).

Stature: Cannot be determined.

Completeness: Moderately complete infracranial skeleton and incomplete skull. The skull is represented by the left mandible, the left zygoma, left temporal, petrous fragments, and portions of the sphenoid. The infracranial remains are missing the cervical vertebrae, scapulae, right humerus, right radius, distal right ulna, left ilium, right fibula, some ribs, some vertebral arches and bodies, and some bones of the hands and feet.

Preservation: Good. There are no fragments of the cranial vault. Incomplete and extensive weathering and fragmentation of the ribs, innominate elements, vertebral arches and cranium. Very little reconstruction was possible because of missing fragments. The bone color is a uniform grey-brown but with two of the right ribs and the left ulna stained black. Bone texture is coarse. There is a slight porcelain ring to the bones.

Associated human remains: A nearly complete occipital bone (missing the *pars lateralis* bilaterally and the *pars basilaris*) and a maxillary central incisor crown both from an older child (< 4 years).

Dental pathology:

Cranial pathology: There is a coarse porotic appearance of the ectocranial surface of the cranial vault bones, including the left zygoma, *pars basilaris* and *pars lateralis*, which is difficult to distinguish from postdepositional changes.

Skeletal pathology: None noted.

Noteworthy features:

Comments: Photographs: *pars basilaris*, left zygoma, *pars lateralis*. Radiographs: femur and tibia, fibula.

Burial No.: BCES 49

Archaeological Context: Early Period III, square D6, northwest quadrant, layer 29, DBDP 3.32 m (skull), NNW 335° (grave cut). Very disturbed area with multiple individuals and pots. Side-by-side with Burial 50 and disturbed by Burial 34 and other features. Plans suggest that one grave directly cut over and into a second.

Age: 35 - 40 years (pubic symphyses and auricular surface morphology).

Sex: Male (*os coxae* morphology).

Stature: 163.0 ± 4.0 cms (5' 3½") [left femur].

Completeness: Partial infracranial skeleton and incomplete cranium. Cranial remains include the left parietal, temporals, left maxillary fragment with the first molar *in situ*, and two loose mandibular teeth. The infracranial remains include the left humerus; right ulna and left radius missing the distal ends, right third metacarpal, left first metacarpal and trapezium, femora of which the right is missing the head, tibiae, fibulae missing the ends, calcanea, right talus, left cuboid, left second through fifth metatarsals, two foot phalanges, *os coxae*, sacrum, three lumbar and four thoracic vertebrae, and a few metacarpals.

Preservation: Good. Although incomplete and sorted from commingled remains, bone preservation is good. Little reconstruction was possible. The infracranial skeleton required minimal reconstruction. There is evidence of old disturbance and breakage of these remains. There are insufficient fragments for the missing portions. Weathering of the foot bones is extensive, and the ribs are poorly preserved. The sacrum required reconstruction. The cranial remains are orange-tan in color and coarse to the touch. Bone color in the infracranial remains is tan with some grey mottling. Bone has a porcelain ring.

Associated human remains: See Burial 49A; and two subadult bones: lumbar vertebra and long bone fragment.

Dental pathology: Wear to the dentin in the maxillary first molar. Interproximal caries in the right mandibular canine. Slight hypoplasia in the maxillary molar and mandibular canine. Slight alveolar resorption at the maxillary premolar and first molar sockets.

Cranial pathology: The left parietal is quite thick and heavy. There is healed coarse porosis of the superior area with a coarse granular appearance to the cortex. Thickness measurements of the parietal are 6 mm.

Skeletal pathology: Appendicular and vertebral osteoarthritis ranges from none to slight. Slight extension of the medial tubercle of the bilateral calcaneus. Laminal spurring of the five thoracic vertebrae present. The left first metacarpal and left trapezium have advanced osteoarthritic changes. There is eburnation of the central disc area of both joint surfaces and lipping around the entire facet.

Noteworthy features: A deep groove is noted at the anterior lessor trochanter of the femur at the insertion of the *vastus medialis* and *psoas major*. Squatting facets of the distal tibiae and tali.

Comments: Sacrum and *os coxae* are a good match. The cranium appears younger than the infracranial remains. Intrusive remains from Burial 34 are too small for this individual. Aging: Pubic symphysis McKern $\Sigma 12$ 29.2±3.33; Todd VII 35-39; Suchey IV 35.2±9.4; Auricular surface IV 35-39;

Sternal rib end IV 27.7±4.62; Cranial suture closure post. $\Sigma \geq 1$ $\geq 30.5 \pm 9.6$. Added from Bag #2250 [11-8-75 D6 NWQ Level 30] are the right third metacarpal shaft, left first metacarpal and trapezium, right talus, left cuboid, two foot phalanges, left proximal fourth and fifth metatarsal. Photographs: proximal femoral shaft, left femur. Radiographs: left humerus, right tibia, left femur, cranium.

Burial No.: BCES 49A

Archaeological Context: Sorted from Burial 49 but not recognized as a discrete skeleton during excavation.

Age: 45 - 50 years (auricular surface morphology).

Sex: Male (*os coxae* morphology and infracranial bone size).

Stature: 164.7 ± 8.8 cms (5' 4½") [segment measurement right tibia].

Completeness: Fragmentary infracranial skeleton and skull. The cranium is represented by the posterior left parietal and some sphenoid fragments. Infracranial remains include clavicular midshafts, left scapula, first and second cervical vertebrae, left humeral shaft, right ulna and proximal radius, left distal ulna, some metacarpals and hand phalanges, *os coxae* fragments, left femoral shaft, right tibial shaft, fibulae shafts, right talus, left calcaneal fragment, left first metatarsal, right second and proximal fifth metatarsal, rib heads, and a few vertebral fragments.

Preservation: Poor. Fragmentary and disassociated. Insufficient fragments for the missing elements. Almost no reconstruction possible because of missing bones. Bone color ranges from tan (scapula, clavicle), black (vertebrae and phalanges), to mottled (left femoral shaft). Bone texture is coarse with a porcelain ring. Very disturbed area so association not secure.

Associated human remains: Two subadult bones: lumbar vertebral arch fused at the midline, and a long bone fragment.

Dental pathology:

Cranial pathology: Cranial thickness measured at the left parietal eminence is 4 mm.

Skeletal pathology: Slight appendicular osteoarthritis. Moderate porosis of the cervical vertebral centra and moderate osteoarthritis of the lumbar facets. Laminal spurring of the thoracic and lumbar vertebrae.

Noteworthy features: The first cervical vertebral right superior facet is double. Robust humerus. Squatting facet in the distal right tibia.

Comments: The intrusive occipital in Burial 50 does not belong here. Aging: Auricular surface VI 45-49. Photograph: first cervical facet.

Burial No.: BCES 50

Archaeological Context: Early Period IV, square D6, north quadrants, layer 29, DBDP 3.56 m (lower legs), NNW 340°. Supine, extended burial next to Burial 49 and disturbed by Burial 34 and other cuts. The lower legs and feet are *in situ* with a pot placed between the feet and another pot between the lower legs. The upper body is scattered and disarticulated.

Age: 25 - 30 years (cranial suture fusion; pubic symphysis, auricular surface and sternal rib end morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 171.2 ± 4.0 cms (5' 7") [left femur].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing the left half of the mandible, some maxillary anterior teeth, the right zygoma, and fragments of both parietals. The infracranial remains are missing the manubrium, most carpals, three metacarpals, most distal hand phalanges, the right patella, left second cuneiform, and most distal foot phalanges.

Preservation: Excellent. The maxillary left third premolar is broken off at the roots postdepositionally. Many of the vertebrae, the long limb bones, mandible and cranial vault required no reconstruction. Some weathering loss and damage to the foot bones, the scapulae, and distal femoral condyles. Vertebrae are in excellent condition. Bone color is fairly uniformly mottled black and tan. The right tarsals have a reddish stain. Two right phalanges are blackened. There is a porcelain ring to the remains. The cortex is solid, smooth, and feels polished to the touch.

Associated human remains: An occipital (adult, ?male), and a blackened fragment of a child's mandible (2 - 3 years) with two deciduous molars *in situ* [this may go with the subadult remains in Burial 49].

Dental pathology: Slight calculus on the mandibular teeth and a few maxillary molars. Caries in the mandibular right second molar with excavation of the fissure. There is a brown stain on the high points of the occlusal surface of the maxillary teeth. The mandibular molars have a horizontal thin brown stain on the buccal crown surfaces. Dentin is exposed in the anterior teeth with enamel wear in the posterior teeth.

Cranial pathology: Tympanic thickening. The tympanic plate is folded over at the junction of the floor and the mastoid. The left mastoid process has a grooved notch which divides the process into two at the posterior midline. There is no reactive bone and no sign of infection. The frontal bone has cracking and breakage which appears old and has been obscured by recent breakage. The missing left zygoma exposes the maxilla which is stained grey. The frontal bone at the supraorbital area has an impressed, depressed fracture. There is no reactive bone formation or evidence of infection, but the fracture may have been sustained at or around the time of death. Cranial vault thickness measurements range from 6 to 11 mm.

Skeletal pathology: Slight osteoarthritis of the vertebral articular facets, hips, and feet. The posterior tali are strongly grooved for the *flexor hallucis longus*. There is a proximal extension of the articular facet of the heads of the first metatarsals with lipping and osteoporosis. The left clavicle has a large pointed osteophyte at the anterior site of the conoid tubercle. The area is smooth cortical bone and is well remodeled. The osteophyte extends 6 - 7 mm from the shaft of the clavicle. The left third metatarsal has a lytic lesion of the proximal articular surface at the inferior lateral border. The defect is smooth walled with a porotic bottom. Trabeculae are present and are smooth and rounded. The right third metatarsal also has the defect, but it has not yet perforated the articular surface. There is an inferior extension of the facet on this right third metatarsal. The third cuneiform on the right side has a corresponding single smooth walled lesion and an extension of the inferior edge of the articular surface. Laminal spurring of the thoracic and lumbar vertebrae.

Noteworthy features: Bilateral bridging of the superior facet of the first cervical vertebra. Parietal notch bones, epipteric bone on the right. The upper femora have robust attachments. Squatting facets of the distal tibiae and tali. The left patella has an enlarged medial tubercle. The calcaneal peroneal insertions are facets.

Comments: The cranium was originally assigned to Burial 49. However, the completeness of this burial, presence of the mandible (which articulates well with the maxilla), age, color, and preservation suggest it should be assigned here. Aging: Pubic symphysis McKern $\Sigma 8$ 24.1±1.93; Todd IV-VII 25-26/35-39; Suchey II 23.4±3.6; Auricular surface III 30-34; Sternal rib end II-III 21.9±2.13-25.9±3.5; Cranial suture closure post. $\Sigma=0$ =30.5±9.6, ant. $\Sigma=0$ =32.0±8.3. Photographs: skull, teeth, first cervical vertebra, mandible, tooth stains, left clavicle, left tarsal, femur, third metatarsal, first metatarsal. Radiographs: third metatarsal, right humerus, right tibia, right femur, right fibula, right radius and left ulna.

Burial No.: BCES 51

Archaeological Context: Early Period IV, square D5, center, layer 28, DBDP 3.61 m (skull), NW 325°. Supine, extended burial with a pot beyond the head and one between the tibiae. A large disturbance at the knees. This burial cut into Burial 45.

Age: 40 - 45 years (ectocranial suture fusion, auricular surface, pubic symphysis, and sternal rib end morphologies).

Sex: Male (cranial and *os coxae* morphology).

Stature: 166.7 ± 4.2 cms (5' 6") [right fibula].

Completeness: Substantially complete infracranial skeleton and skull. The skull is missing the anterior occipital and condyles, sphenoid body, left zygoma, and three maxillary teeth. The infracranial remains are missing the first three cervical vertebrae, sternal ends of the left ribs, two right carpals, patellae, proximal tibiae, distal femora, right second cuneiform, and most middle and distal hand and foot phalanges.

Preservation: Good. The cranium was reconstructed from many fragments and the face was attached. There is distortion of the parietals because of postdepositional warping. The mandible was reconstructed. The *os coxae* and sacrum are very weathered but complete, and the hands and feet are well preserved. A disturbance removed the distal femora leaving old, stained breakage. There are no other fragments. The infracranial remains are tan to light brown in color, coarse in texture, and have a porcelain ring. The metatarsal shafts are stained black.

Associated human remains: None.

Dental pathology: Premortem loss of the maxillary right first molar. The mandibular right third molar is impacted with the tooth horizontal, crown anterior, documented by radiograph. Slight calculus in most teeth and slight alveolar resorption. Dental wear exposes the pulp in the maxillary third premolars while there is dentin exposure in all other teeth. Caries in the occlusal surface of the mandibular right third molar. Slight hypoplasia in the maxillary incisors. The mandibular right molars have a scooped wear pattern.

Cranial pathology: Healed coarse porosis of the superior frontal bone at the bregma, superior occipital, and superior parietals at the sagittal suture. The cortical surface is irregular, and there is porosis of the outer table which is incompletely remodeled. Cranial vault thickness measures from 6 - 13 mm.

Skeletal pathology: Slight appendicular osteoarthritis, except for the calcaneus, the first metatarsal head and proximal phalanges, where moderate changes are seen. The anterior talar facet of the calcaneus has an anterior and superior extension off the lateral side. The first metatarsal head articular facet is extended on the superior lateral surface with a smooth-walled erosive lesion along the lateral articular surface. Vertebral osteoarthritis is slight to moderate. Moderate lipping is present in the lumbar articular facets. Laminal spurring of the thoracic vertebrae.

Noteworthy features: Fused costochondral cartilage of the right first rib. Fused hyoid body and horn. Squatting facets of the distal tibiae and tali.

Comments: Previous restoration of the cranium and mandible was taken apart and redone with somewhat better results. Aging: Pubic symphysis McKern Σ15 41.0±6.22; Todd IX 45-50; Suchey X 45.6±10.4; Auricular surface VI 45-49; Sternal rib end V 38.8±7.0; Cranial suture closure post. Σ=3 =34.7±7.8, ant. Σ=1 =32.0±8.3. Photographs: mandible, cranium, tooth wear, right first metatarsal, proximal phalanges, fifth lumbar vertebra, eleventh thoracic vertebra. Radiographs: right humerus, right radius and ulna, right tibia, left fibula, mandible, cranium.

Burial No.: BCES 52

Archaeological Context: Early Period III, square D5, west quadrants, layer 28, DBDP 3.62 m (skull), NNW 335°. Supine, extended, primary burial with pots distal to the feet and disturbance of the left humerus, forearm, and thorax.

Age: 6 - 7 years (dental eruption).

Sex: ?Male (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Nearly complete infracranial skeleton and substantially complete skull. The cranium is missing the posterior right parietal, the anterior left parietal, the left frontal at the coronal suture, the superior left temporal, and a portion of the left zygoma. The mandible is missing the left condyle and few teeth. Infracranial remains are missing the left clavicle, scapula and humerus, most hand bones, some vertebral bodies and arches, some left ribs, sternal elements, some metatarsals, and all phalanges.

Preservation: Excellent - Good. The mandible and cranium were reconstructed. There is skewing of the right parietal above the frontal bone and the inferior occiput is askew. Vertebral bodies and most epiphyses are weathered and worn. Ribs are fragmentary. Infracranial remains required little reconstruction. Bone color is mottled tan-brown-black and fairly uniform, although the skull is lighter in color. The bones have a porcelain ring.

Associated human remains: A single small mandibular fragment, two loose molar crowns and a ?fetal left zygoma.

Dental pathology: There is slight calculus on the deciduous dentition. Dental wear exposes the dentin in the maxillary deciduous anterior teeth and the mandibular deciduous molars. Hypoplasia in the deciduous mandibular right canine, in the form of a circular defect in the center of the labial surface, and hypoplasia in the deciduous maxillary right central incisor. Black staining on the mandibular deciduous right second molar occlusal surface.

Cranial pathology: Slight cribra orbitalia evident, although observations are complicated by weathering. Tympanic thickening and dehiscence.

Skeletal pathology: Enlarged nutrient foramen in the right fourth metatarsal.

Noteworthy features: Carabelli's cusps on the maxillary permanent first molars.

Comments: Dental age 6 - 7 years, epiphyseal age 4 - 6 years. Photographs: Carabelli's cusps, tympanic thickening, cranium, mandible, right fourth metatarsal. Radiographs: femora, right radius and ulna, fibula, cranium.

Burial No.: BCES 53

Archaeological Context: Early Period V/Middle Period VI, square D4, northwest quadrant, layer 22, DBDP 2.79 m (arm), S 170°. The right arm and innominate are *in situ*, burial position is assumed to be supine and extended. Disturbed by Burial 39. The skull and left side of the burial is in the west baulk. A pot appears at the right side of the foot area.

Age: Older young adult - middle-age (osteoarthritis).

Sex: ?Male (humeral head diameter).

Stature: 160.3 ± . cms (5' 3") [right humerus]

Completeness: Fragmentary infracranial remains and a cranial vault fragment. A portion of the right parietal or left frontal represents the cranium. Present from the infracranial skeleton are the right humerus, radius, ulna, second metacarpal and two proximal hand phalanges, sternum, right iliac crest, right greater trochanter of the femur, a fibular shaft fragment, left proximal radius, left rib fragment, fourth lumbar vertebra, the right second cuneiform, and first distal foot phalanx.

Preservation: Excellent. Although incomplete, the right arm bones are complete and intact. All breakage is new. The bone color is light tan and uniform over most bones. The left rib and lumbar vertebra are reddish tan in color. There are no fragments for reconstruction.

Associated human remains: None.

Dental pathology:

Cranial pathology: None noted on the single vault fragment.

Skeletal pathology: Slight osteoarthritis of the humeral head, trochlea and proximal radius. The right humerus is bowed laterally (apex lateral). There is no anterior-posterior rotation, the deltoid tuberosity is strongly marked, and the bicipital groove is quite deep. The ?fourth lumbar vertebra has slight articular lipping, but the superior surface of the body is lipped anteriorly and slightly stepped as if the disc material was protruding.

Noteworthy features: The greater trochanter is quite large.

Comments: The lumbar vertebra, fibula fragment and left rib may not belong to this burial. The lumbar vertebra seems quite small. Photographs: fourth lumbar vertebra. Radiographs: right humerus, right radius and ulna.

Burial No.: BCES 54

Archaeological Context: Early Period IV, square D6, northeast quadrant, layer 30, DBDP 3.57 m (skull), NNW 328°. Supine, extended, primary burial with an associated bracelet at the right wrist. Cut by Burial 55. Disturbance of the right tibia and both feet.

Age: 3 - 4 years (dental eruption and diaphyseal length).

Sex: ?Female (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Fairly complete infracranial skeleton and skull. The skull is missing most of the occipital except the *pars basilaris*, portions of the parietals, the middle of the maxilla, upper temporal bones and some teeth. The mandible is complete except for some teeth. The infracranial skeleton is missing the carpals, the right metacarpals and most hand phalanges, *os pubis* bilaterally, distal tibiae, most of the fibulae, feet, and sternal elements.

Preservation: Good. The skull could not be reconstructed. There is warping of the parietals. The frontal was restored from many pieces. The maxilla could not be restored. The mandible is complete. Little reconstruction in the infracranial skeleton was possible. Weathering loss of all bones, ribs, and especially the hand bones. Few epiphyses recovered. The infracranial bones are mottled brown and tan. The femora are light pink-beige as are the left ilium and clavicles. Bone texture is coarse. The remains have a porcelain ring.

Associated human remains: Two loose teeth: one deciduous canine (may go with Burial 62) and one central incisor.

Dental pathology: Possible hypoplastic defects in the left mandibular deciduous canine and first and second molars, and the maxillary deciduous second molar. There are no defects of the opposing side suggesting that the loss of enamel may be post-mortem. Dental wear is to the enamel in all deciduous teeth, except for the incisors where dentin is exposed.

Cranial pathology: Cribra orbitalia of both orbits appears as elongated foramina which are not raised. No thickening or porosis of the vault bones present.

Skeletal pathology: None noted.

Noteworthy features: Moderate shoveling of the maxillary permanent incisor crowns. Slight brown staining on the maxillary permanent tooth caps. Carabelli's cusps on the maxillary permanent left first molar.

Comments: Photographs: permanent incisors, cribra orbitalia. Radiographs: femora, right humerus, radius and ulna, mandible.

Burial No.: BCES 55

Archaeological Context: Early Period IV, square D6, northeast quadrant, layer 30, DBDP 3.64 m (skull). Primary burial in a flexed position with the legs under the vertebral column and the upper body slumped forward, and head twisted to the left side. Bracelets at both elbows.

Age: 14 - 16 years (epiphyseal fusion and sternal rib end morphology).

Sex: ?Male (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Substantially complete infracranial skeleton and skull. The skull is missing the body and wings of the sphenoid, zygomatic processes of the temporals, and fragments of the coronal suture. The mandible is missing two teeth and the left condyle. The infracranial remains are missing the sternal rib ends, scapula blades, portions of the distal forearm bones, carpals, most hand phalanges, left patella, distal left tibia, proximal left fibula, left calcaneus, most foot phalanges, most of the *os coxae*, distal sacrum, and sternum.

Preservation: Good - Fair. The face, mandible, and vertebrae are well preserved. There are insufficient fragments for missing elements. The cranial vault was reconstructed with lateral compression, but the face could not be restored to the vault. The *os coxae*, left tibia, fibula, feet and hands are weathered and fragile. Bone color is tan and smooth in upper elements, mottled white and brown, and fragile in the lower elements. Porcelain ring of all bones.

Associated human remains: Left zygoma of a child, mandibular molar crown with open roots [too small for Burial 54, but may go with Burial 62].

Dental pathology: Retained maxillary deciduous left lateral incisor positioned between the permanent lateral incisor and the canine. Bilateral supernumerary premolar-shaped teeth in the mandible, between the second and third molars. Premortem loss, possible ablation, of the mandibular central incisors. Premortem loss of the mandibular right first molar with complete alveolar resorption. Slight dental wear.

Cranial pathology: Alveolar prognathism. Cranial vault thickness measurements range from 5 - 6 mm.

Skeletal pathology: Laminal spurring of the lower thoracic vertebrae.

Noteworthy features: Wormian bones at the lambda and in the sagittal suture. Asymmetrical fusion of the epiphyses: the left femoral head is fused while the right is not.

Comments: Burial position of the individual is unusual. Photographs: mandible, maxilla, cranial vault shape, wormian bones. Radiographs: left humerus, right radius, right tibia, right femur, mandible, face.

Burial No.: BCES 56

Archaeological Context: Early Period V, square D4, northeast quadrant, surface of layer 26, DBDP 3.00 m (skull), S 180° (corrected). Supine, extended, primary burial with a laterite boulder over the left pelvis. Disturbances of the left femur, left hand, left foot and right shoulder. Pots over tibiae and beyond the head.

Age: 45 - 50 years (auricular surface morphology, dental wear, osteoarthritis).

Sex: Male (cranial and *os coxae* morphology).

Stature: 161.1 ± 4.1 cms (5' 3½) [left bicondylar femur].

Completeness: Moderately complete infracranial skeleton and skull. The skull is missing the sphenoid body, the occipital at the opisthion, maxilla and right maxillary teeth, left mandibular body posterior to fourth premolar, right gonion and condyle. Infracranial remains are missing the cervical vertebrae, thoracic vertebral bodies, left scapula, ends of the clavicles, humeral heads, proximal radial shafts, pubic symphyses, left talus, calcaneus, most middle and distal foot phalanges, all ribs, and sternum.

Preservation: Good - Fair. The cranium was incompletely reconstructed from small fragments, and has extensive weathering of the posterior parietals and superior occipital. These bones are chalky white while the face and mandible are hard and tan. The infracranial remains have better preservation of the legs and feet, which are tan in color and have a porcelain ring. The spine and upper arms are incomplete, weathered, fragmentary and soft. Few vertebral bodies are present.

Associated human remains: Sacral crest fragments, proximal foot phalanx.

Dental pathology: Premortem loss of the mandibular right first and third molars. Hypercementosis of the maxillary molars. Dental wear exposes the pulp in the anterior teeth and dentin in the posterior teeth present. Slight to moderate calculus, slight alveolar resorption. There is a single neck caries in the maxillary right third molar.

Cranial pathology: Healed coarse porosis in the superior frontal and superior parietal. Cranial vault thickness measurements range from 5 - 9 mm.

Skeletal pathology: Marked osteoarthritis of the right inferior facet of the sixth thoracic vertebra, moderate osteoarthritis of the right facets of the seventh, ninth, tenth, and eleventh thoracic vertebrae. Articular facets in the remaining vertebrae have slight osteoarthritic changes. Moderate lipping in the single lower lumbar vertebral body fragment present. Osteoarthritis of the long limb bones is slight except in the first metatarsal, proximal phalanges, and the distal left ulna, where it is moderate. There is eburnation of the head of the first metatarsal and the proximal phalanx on the right side. Laminal spurring of the lower thoracic and lumbar vertebrae.

Noteworthy features: Bipartite *os inca* bone. The left *fovea capitis* is much deeper and more defined than the right. Squatting facets of the distal tibiae and tali.

Comments: Two skulls were labeled B. 56 initially [see Burial 59]. Aging: Auricular surface VI 45-49; Cranial suture closure post. $\Sigma \geq 5$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: maxillary teeth, mandible, bipartite *os inca*, first metatarsal, lumbar vertebrae. Radiographs: right fibula, right tibia, left femur, vault.

Burial No.: BCES 57

Archaeological Context: Early Period II, square D5, northwest quadrant, layer 29, DBDP 367 m (skull), NNW 332° (corrected). Supine, extended, primary burial with pottery at the head and feet, and rice under the skeleton. Disturbances of the right forearm, left arm, and feet and possibly the skull. The left arm bones were recovered near the left *os coxae*.

Age: Middle-age (dental wear).

Sex: ?Female (cranial morphology and infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. The skull is represented by the right mandible to the left fourth premolar, left maxillary canine and premolar, right posterior temporal, and articulating parietal and occipital fragments. The infracranial remains include fragments of the clavicular shafts, right glenoid, distal right ulnar shaft, the left ulna missing the distal end, distal humeral shafts, distal left radius, proximal right femur half, left femoral shaft, distal tibiae fragments, right talus, right calcaneus fragment, right cuboid, and three right metatarsals, and a few rib and vertebral fragments.

Preservation: Poor. The mandible and teeth are the best preserved elements. Skeletal remains are incomplete, fragmentary and unable to be reconstructed. There are insufficient fragments for missing material. The skeletal preservation limits observations. The bone is tan in color, soft, coarse in texture and without a porcelain ring. The cranial fragments are mottled dark brown, and very poorly preserved.

Associated human remains: None.

Dental pathology: Dental wear exposes the dentin in the anterior teeth and the first molars. Moderate alveolar resorption of the mandibular premolar sockets. Brown staining on the occlusal surface of the posterior mandibular teeth with a very black stain on the left mandibular second molar.

Cranial pathology: There is a fine porosity of the exterior auditory meatus at the suprameatal triangle of the right temporal.

Skeletal pathology: Slight osteoarthritis of the right foot and left forearm bones.

Noteworthy features: Squatting facets of the distal tibiae.

Comments: The tibiae and fibulae shafts present in the field are not present in the laboratory. Maxillary teeth present may not belong, but the mandible correlates well with the field photograph. The left humerus, radius and ulna were displaced to the east and appeared larger than the right to the excavators; however measurements seem close enough to be associated with B. 57. Photographs: dental wear.

Burial No.: BCES 58

Archaeological Context: Early Period II - III, square D5, east quadrants, layer 29, DBDP 3.76 m (skull), NNW 329° (corrected). Supine, extended, primary deteriorated burial with a pot at the feet. Disturbance of the left lower leg.

Age: Late adolescent (unfused spheno-occipital synchondrosis, mandibular third molars unerupted).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. The skull is represented by the anterior mandibular body with teeth *in situ*, all mandibular teeth, loose maxillary teeth, and fragments of the vault including the anterior basiocciput. The infracranial skeleton is represented by a bag of fragments of which only the scapulae at the suprascapular area are identified.

Preservation: Poor. The teeth are well preserved, but there is some flaking of the roots. No reconstruction of any element was possible. The bone is soft, flaky, coarse and much has fused together. The bone color is tan with some white powder adherent. The cranial vault is beige with some black mottling. Yellow-grey mud is adherent to some of the bone fragments.

Associated human remains: None.

Dental pathology: Slight enamel hypoplasia in the maxillary incisor and canine. Slight calculus on the maxillary and mandibular teeth. Brown staining on the occlusal surface and labial surfaces of all teeth. Dental attrition has flattened the cusps of the first molars and enamel of all other teeth.

Cranial pathology:

Skeletal pathology:

Noteworthy features:

Comments: Insufficient fragments for what was illustrated in the field drawing. Some of B. 57 and B. 58 infracranial remains commingled. Excavators did not note unfused epiphyses, but did note a possible gallstone (which was not found in laboratory). Photographs: dental staining.

Burial No.: BCES 59

Archaeological Context: Early Period V, square D4, southwest quadrant, layer 27, DBDP 3.28 m (skull), S 185°. Supine, extended, primary burial with a pot beyond the feet and disturbance of the proximal right humerus.

Age: 45 - 50 years (ectocranial suture closure; sternal rib end and auricular surface morphology).

Sex: Female (cranial and *os coxae* morphology).

Stature: 151.3 ± 4.4 cms (5' 0") [left fibula].

Completeness: Substantially complete infracranial skeleton and skull. The skull is complete but the sphenoid and basiocciput are fragmented. The infracranial remains are missing the sternum, manubrium, right humeral head, some carpals, middle and distal phalanges of the left hand, proximal fibulae, distal end of the right fibula, left pubic symphysis, sacral bodies, anterior vertebral bodies, left third metatarsal, and middle and distal foot phalanges.

Preservation: Good - Fair. The cranium was reconstructed with the face attached, but is skewed and flattened in the anterior-posterior direction. Most infracranial bones are weathered and have been reconstructed. Vertebral and sacral bodies are poorly preserved as are the epiphyses at the knee. Ribs could not be reconstructed. Bone color is grey-tan and uniform throughout the skeleton. Coarse in texture, some bones have a porcelain ring.

Associated human remains: A subadult hand phalanx (? proximal), bilateral *os coxae* fragments of the auricular surface, single ischial tuberosity with acetabular fragment (some fragments labeled Burial 56).

Dental pathology: Premortem loss of the maxillary left first molar with complete alveolar resorption and anterior shifting of the second and third molars. Occlusal caries in the mandibular canines. Moderate alveolar resorption of the molar sockets in both jaws. Slight linear hypoplastic defects in the maxillary second and third molars. Dental wear exposes the pulp in the mandibular premolars and the right first and second molars and in the maxillary right third premolars and left fourth premolar. Dentin in all other molars. Slight to moderate calculus.

Cranial pathology: Premature fusion of a portion of the right coronal suture has resulted in a skewing of the cranial vault. In the superior view, there is shortening of the right side of the vault compared to the left, and flattening of the right frontal. Cranial vault thickness measurements range from 7 - 11 mm.

Skeletal pathology: Slight osteoarthritis of most of the appendicular skeleton with moderate changes in the left patella. Vertebral articular facets exhibit slight lipping. The cervical vertebral bodies have slight porosis of the centrum while the thoracic and vertebral bodies are not preserved well enough to evaluate. Laminal spurring of the thoracic and second lumbar vertebrae. The distal articular facets of the bilateral first metatarsals are extended along the lateral dorsal surface. The ventral surface of the right pubic ramus has two enlarged tubercles, the pubic tubercle at the superior surface (insertion of the *adductor longus*) and the second near the inferior edge (insertion of the *adductor brevis* or *gracilis*). Large parturition pitting in the right pubic symphysis and preauricular sulci suggest childbirth.

Noteworthy features: Double calcaneal facet. Squatting facets of the distal tibiae and tali.

Comments: Some skull fragments labelled B. 56. Aging: Pubic symphysis Gilbert $\Sigma 15$ 55.7±3.24; Todd X 50+; Suchey VI 60.0±12.4; Auricular surface IV 35-39; Sternal rib end V 40.0±12.2; Cranial suture closure post. $\Sigma \geq 4$ $\geq$34.7±7.8, ant. $\Sigma \geq 1$ $\geq$32.0±8.3. Aging was difficult in this individual as the pubic symphysis appears 60 years but the skull vault and auricular surface appear younger. Photographs: calcanea, superior vault, pubic symphysis, patella, mandible, maxilla. Radiographs: cranium.

Burial No.: BCES 60

Archaeological Context: Early Period II - III?, square D6, northeast quadrant, layer 31, DBDP 3.73 m (skull), 340° NNW. A cranium in a grave cut is the only visible portion of burial in field drawing. There is a small pot at the left side.

Age: 9 - 18 months (dental eruption and diaphyseal length).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and fragmentary skull. The skull is represented by the right zygoma, left mandibular ascending ramus and posterior body, two loose deciduous molar crowns, and a vault fragment. The infracranial remains include the left clavicle, complete right radius, right ulnar shaft fragments, left ilium, bilateral pubis, left fibula, fragments of the right fibula, left tibia, femoral shaft fragments, ribs, and vertebral arch fragments.

Preservation: Fair. The radius and fibula are the only complete bones. The tibia and femoral shaft fragments, and the rib fragments are extremely weathered and have a whitish precipitate. The vertebral bodies, right ribs, ulna, and left ilium are blackened. There is a wide range of color from tan to blackened. The bones have a porcelain ring.

Associated human remains: None.

Dental pathology: None noted in the unerupted deciduous molar crowns. The two crowns are stained brown.

Cranial pathology:

Skeletal pathology: None noted.

Noteworthy features:

Comments: Dental age 6 - 12 months, diaphyseal length age 1 - 2 years.

Burial No.: BCES 61

Archaeological Context: Early Period IV, square D4, northwest quadrant, layer 27, DBDP 3.30 m (skull), NNW. Disturbed, very fragmentary, humerus, radius, and frontal noted in field, but not in anatomical position.

Age: Middle-aged (dental wear).

Sex: ?Female (humeral head diameter and infracranial bone size).

Stature: 154.0 ± . cms (5' ¾") [right radius].

Completeness: Fragmentary infracranial skeleton and cranium. The cranium is represented by the left maxilla with the fourth premolar and first molar *in situ*, frontal, zygomas, and right temporal. Infracranial remains include the complete left radius, right humerus missing the distal end, a right rib head fragment, and a right scapula fragment at the acromion process.

Preservation: Good - Fair. Incomplete remains; all breakage is old. The maxillary fragment is weathered with breakage of the alveolus and posterior sinus. There are no additional fragments. No reconstruction of the bone was possible with the exception of the humeral head. The radius is complete. Bone color is orange-tan, coarse in texture, and has a porcelain ring. There is some light black mottling of the midshaft of the radius.

Associated human remains: None.

Dental pathology: Premortem loss of the maxillary left second molar and possibly the third molar with complete resorption of alveolus. There is a circular defect, without reactive bone formation, at the apex of the left maxillary lateral incisor on the interior of the maxilla. The absence of the tooth makes exact description difficult, maybe an abscess or irregular root formation. The wear on the molar and premolar exposes the dentin. Calculus is slight.

Cranial pathology: Raised, coalesced cribra orbitalia of the left orbit, but not the right. Slight thickening of the frontal.

Skeletal pathology: Slight osteoarthritis of the radial articular facets.

Noteworthy features:

Comments: Photographs: maxillary ?abscess, cribra orbitalia. Radiographs: left radius.

Burial No.: BCES 62

Archaeological Context: Early Period III-IV, square D6, layer 31, northeast quadrant and D6/D7 baulk, layer 22, DBDP 3.74 m (skull), NNW 326°. Supine primary burial, somewhat disturbed and lower legs removed probably by B. 54.

Age: 5 - 7 years (dental eruption and diaphyseal length).

Sex: ?Female (mandibular and iliac morphology).

Stature: Cannot be determined.

Completeness: Moderately complete infracranial skeleton and skull. The skull is missing the left zygoma, inferior occipital, *pars lateralis* and *basilaris*, symphysis menti of the mandible, and some deciduous teeth. Infracranial remains are missing the left scapula, proximal clavicles, right distal humerus, left proximal radius, left pubis and ischium, femoral head epiphyses, distal tibiae, fibulae, hands, feet except the right talus, cervical and upper thoracic vertebrae, sternal elements, and the lower ribs.

Preservation: Good - Fair. The cranium is weathered and exfoliating; the vault could not be restored. The maxilla is well preserved. The mandible could not be reconstructed. Infracranial remains required some reconstruction of the ribs and vertebrae. Long limb bone diaphyses are well preserved. The right forearm and *os coxae* are poorly preserved. There are insufficient fragments for the missing elements. Bone color ranges from tan to mottled grey-brown. Porcelain ring to many of the bones. There is an orange-red spot of stain on the distal lateral left femoral diaphysis.

Associated human remains: Adult left humerus missing head, adult axis body missing the arch, adult right zygoma.

Dental pathology: Dental wear exposes the dentin in the deciduous teeth. There is a light brown horizontal stain on the midcrowns of the permanent molars which is greater in the mandible than in the maxilla.

Cranial pathology: Cribra orbitalia evident in the fragments of the superior orbits. To the right of the glabella on the frontal fragment there is a small depressed "suture" with an odd pattern. This suture is not in the midline and does not appear to be a residual metopic suture, although it may be anomalous. The location is directly over the bridge of thickened bone dividing the internal sinus. There is no active bone growth present.

Skeletal pathology: The distal left humerus has a small eroded area on the anterior distal lateral shaft, just above the end of the metaphysis. There are two indentations separated by a bony bridge. The lateral indentation has exposed, thickened trabecular bone in the base, while the medial defect is a depression of the cortex. There is no reactive bone surrounding either defect. Radiograph documents a small circular lytic lesion without sclerotic borders.

Noteworthy features: Tympanic thickening, tympanic dehiscence, Carabelli's cusps of the maxillary deciduous second molars and the maxillary permanent first molars.

Comments: Burial 62 cut through Feature 6A (now named B. 79). Photographs: tooth wear, distal humerus, ilium. Radiographs: femora, humerus, dental radiograph of the mandible and maxilla, frontal.

Burial No.: BCES 63

Archaeological Context: Early Period III - IV, square D4, southeast quadrant, layer 27, DBDP 3.32 m (skull), NW 310°. Infant in jar burial; the lower legs are missing.

Age: 9.5 lunar months fetus (diaphyseal length and epiphyseal fusion).

Sex: ?Male (mandibular and iliac morphology).

Stature: Cannot be determined.

Completeness: Moderately complete infracranial skeleton and fragmentary skull. The cranium is missing the face, maxilla, and most vault bones. The mandible is missing all tooth buds. Infracranial remains are missing the feet, tibiae, fibulae, distal right femur, distal left ulna, some thoracic and cervical vertebral bodies, sacral bodies, and left metacarpals.

Preservation: Good. Although the cranium is fragmented, the infracranial remains are remarkably complete and intact for the age of this individual. No reconstruction of the cranium was possible. Some of the long limb bones were reconstructed. There is weathering of the cortex of most bones, exposing the trabeculae beneath and giving a coarse appearance. Bone color is tan, uniform over entire skeleton. There is a slight porcelain ring.

Associated human remains: None.

Dental pathology:

Cranial pathology: The *pars basilaris* is porotic which may be due to weathering. The *pars lateralis* is not porotic. The cranial vault bones are not thickened or porotic in appearance.

Skeletal pathology: None noted.

Noteworthy features:

Comments: Radiographs: humerus, radius and ulna.

Burial No.: BCES 64

Archaeological Context: Early Period IV, square D4, southeast quadrant, layer 26-27, DBDP 3.22 m (skull), SE 144° (pot). Infant jar burial.

Age: 9.5 - 10 lunar months fetus (diaphyseal length, foramen of Huschke).

Sex: ?Female (iliac morphology).

Stature: Cannot be determined.

Completeness: Fragmentary calvarium and nearly complete infracranial remains. Present from the calvarium are the petrous portions of the temporal, right supraorbital region of the frontal, right mandible and left *pars lateralis*. The infracranial remains are missing the metatarsals, left tibia and fibula, right tibial shaft, pubis and ischium bilaterally, right metacarpals and phalanges, right radius, cervical vertebral bodies, sacral bodies, and arches.

Preservation: Good - Poor. The cranial remains are extremely fragmentary and there are no fragments of missing elements. The infracranial remains are well preserved for the age of the individual. Vertebrae and ribs are quite well preserved. There was some reconstruction of the long limb bones. Bone color is uniformly tan throughout the skeleton with some grey dirt adherent. There is a slight porcelain ring to the long limb bones.

Associated human remains: None.

Dental pathology:

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features:

Comments: Photograph: entire skeleton.

Burial No.: BCES 65

Archaeological Context: Early Period IV, square D4, south quadrants, layer 29, DBDP 3.47 m (skull). Primary burial in a sitting position with a pot. This burial was cut by Burial 69.

Age: 40 - 45 years (symphysis pubis and auricular surface morphology, sternal rib end).

Sex: Male (cranial and *os coxae* morphology).

Stature: 161.7 ± 4.1 cms (5' 3½") [right bicondylar femur].

Completeness: Nearly complete skull and moderately complete infracranial skeleton. The skull is missing the mandibular condyles, mandibular right central incisor and portions of the frontal and right parietals at the coronal suture. The infracranial remains are missing the right clavicle, manubrium, scapula blades, right humeral head, left radial midshaft, few carpals and distal hand phalanges, right patella, proximal left fibula, middle and distal foot phalanges, the sixth and seventh cervical and first nine thoracic vertebrae, the twelfth thoracic and first lumbar vertebrae, sacrum, blade of the left ilium, and most of the ribs.

Preservation: Good. The cranial vault was partially reconstructed, but the face could not be attached. The mandible is intact. The infracranial remains required some reconstruction of the distal femora, proximal tibiae, ribs, and fibulae. The vertebrae, feet, and *os coxae* are the most weathered and fragmentary. Evidence of cleaning in the form of scrapes longitudinally on the bones. There are no fragments for the missing material. Bone color is a uniform tan with some brown-red mottling. Porcelain ring of all bone.

Associated human remains: None.

Dental pathology: Premortem loss of the mandibular right second and third molars, and the left third molar. Huge caries in the maxillary third molars, roots only remaining, and a small interproximal caries in the maxillary left third premolar. Coarse linear enamel hypoplasia in the maxillary and mandibular incisors. Dental wear exposes the dentin in most teeth. Calculus is slight in upper and lower dentitions. Slight to moderate alveolar resorption. Slight winging of the maxillary central incisors. Chipping of the maxillary left central incisor and the mandibular left central incisor with some smoothing of the edges.

Cranial pathology: Enlarged foramina in the nasal bones. The zygomas have healed coarse porosis with residual pitting of the cortex. There is thickening of the bone beneath the zygofacial foramina. There is no reactive bone or evidence of infection. Cranial vault thickness measurements range from 4 - 8 mm.

Skeletal pathology: Slight osteoarthritis in most of the appendicular skeleton except the bilateral acetabula which have marked osteoarthritis. There is bilateral destruction of the cup on the superior side and expansion and roughening of the entire acetabula rims. The femoral heads are moderately lipped. The left tibia has a well healed "bump" of the anterior tibial spine just distal to the midshaft. There is a clean transition to cortical bone at the edges of the swelling and no sign of infection, cloaca, or fracture. Radiograph documents a slight cortical bulge of well healed cortical bone just distal to the midshaft. There are multiple areas of smooth-walled lytic lesions of the articular surfaces in this individual: inferior left glenoid, left lateral posterior tibial plateau, and the left navicular near the medial side of the talar articular surface. Vertebral osteoarthritis is slight in the cervical articular facets and slight to moderate in the lumbar spine. The right fourth metatarsal has an enlarged nutrient foramen on the lateral surface.

Noteworthy features: Rotation of the mandibular premolars approximately 40° clockwise. Possible cutmarks of the distal anterior shafts of the radius and ulna on the right side. The distal right radius has at least three cut marks running obliquely across the anterior surface of the distal shaft. The marks are quite thin and are stained, suggesting they are not cleaning marks. The distal right ulna has three parallel marks on the anterior surface which expose white cortical bone and are likely to be recent cleaning damage. Fused xiphoid. The hooks of both hamates are reduced in size to small nubs without any "hook."

Comments: Unusual burial position. Aging: Pubic symphysis McKern Σ15 41.0±6.22; Todd VIII 39-44; Suchey IV-V 38.2±10.9/48.1±14.6; Auricular surface VI 45-50; Sternal rib end IV 28.2±3.83; Cranial suture closure post. Σ≥0 ≥30.5±9.6, ant. Σ≥0 ≥32.0±8.3. Photographs: dentition, fifth lumbar vertebra, acetabula, first metatarsal, femoral heads, radius and ulna cutmarks, right fourth metatarsal, hamates, sternum. Radiographs: acetabula, fourth and fifth lumbar vertebrae, zygomas, left humerus, right fibula, right radius and ulna, left tibia, left femur, right femur.

Burial No.: BCES 66

Archaeological Context: Early Period III - IV, square D4, southeast quadrant, layer 28, DBDP 3.32 m, SSE/NNW. Infant jar burial. Below Burial 64.

Age: 7 - 7.5 lunar months fetus (diaphyseal lengths).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and fragmentary skull. The skull is represented by the right half of the mandible, left *pars lateralis*, bilateral petrous portion of the temporal, and a few vault fragments. The infracranial remains include the left scapula; left distal humerus, ulnar and radial fragments; the right humerus, ulna, and radius missing the proximal end; ilia, right femur, tibial and fibular diaphyses, six rib fragments, and five vertebral fragments.

Preservation: Fair. The vault is fragmented and weathered. Vault fragments are striated. The infracranial remains are incomplete, weathered and fragmentary. No additional fragments are recovered. Bone color is tan and coarse in texture with some grey-white mottling.

Associated human remains: None.

Dental pathology:

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features:

Comments:

Burial No.: BCES 67

Archaeological Context: Early Period II - IV, square D4, southwest quadrant, layer 28, DBDP 3.40 m (skull). Isolated skull.

Age: 3 - 4 years (epiphyseal fusion).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Incomplete calvarium, four vertebrae, right clavicle and left scapula. The calvarium includes the frontal, right temporal, occiput missing the *pars lateralis* and *basilaris*, and the superior parietals. Two lower thoracic vertebral arches, two lower cervical vertebral arches, left scapula, and right clavicle are present.

Preservation: Good. The cranial vault was reconstructed using all the available fragments. Bone quality is good. Bone color is tan and bone is smooth. There is a mottling of grey on the frontal bone. The vertebral fragments are the same color as the vault fragments. There is a porcelain ring to the bone fragments.

Associated human remains: None.

Dental pathology:

Cranial pathology: The frontal at the left spheno-occipital frontal suture appears expanded and porotic. There is no cribra orbitalia, thickening, or porosis of the vault.

Skeletal pathology: None noted.

Noteworthy features: Tympanic dehiscence and thickening.

Comments: Photographs: right auditory meatus, closeup of the right temporal at the orbit.

Burial No.: BCES 68

Archaeological Context: Early Period II - IV, square D4, southwest quadrant, layer 28, DBDP 3.40 m (skull), NNW. Isolated cranium near the unexcavated sidewall, where it is possible that the remainder of the skeleton lies.

Age: Adult (size).

Sex: ?Male (cranial morphology).

Stature: Cannot be determined.

Completeness: Fragmentary cranium. The right mastoid process and petrous process of the temporal, right zygoma, nasal bones, and right frontal at the orbit are present, as well as a few additional vault fragments.

Preservation: Fair. Incomplete and fragmentary. Some reconstruction possible but insufficient fragments to complete the vault. The interior of the vault is extremely weathered. Bone color is mottled yellow-tan. Bone texture is coarse. The bone feels soft and there is no porcelain ring.

Associated human remains: None.

Dental pathology:

Cranial pathology: Vault thickening. Some of the fragments measure between 9 - 10 mm. Breakage of these fragments indicates that the thickening is in the diplöe.

Skeletal pathology:

Noteworthy features:

Comments: Similar in color to fragments in Bag #2297 [square D4, NWQ, layer 27, Feature 11 from B. 61], but nothing glues together.

Burial No.: BCES 69

Archaeological Context: Early Period IV, square D4, southwest quadrant, layer 29, DBDP 3.74 m (skull), SSE 148°. Supine, extended, primary burial where the cranium was under a large laterite boulder. The lower legs and feet are disturbed and disarticulated.

Age: 25 - 30 years (pubic symphysis and auricular surface morphology).

Sex: Female (*os coxae* and infracranial morphology).

Stature: 153.8 ± 3.0 cms (5' 0") [left femur].

Completeness: Fairly complete infracranial skeleton. Missing are the first six cervical vertebrae, scapular blades and processes, humeral heads and distal ends, left radial ends, right distal ulna and proximal radius, left carpals, some metacarpals, most hand phalanges, the left pubic symphysis, right patella, left proximal and distal tibia, right proximal fibula, tarsals, right first metatarsal, left third metatarsal, and foot phalanges.

Preservation: Good - Fair. The left femur, clavicles, and vertebrae are primarily intact, well preserved, and required minimal reconstruction. The remainder of the skeleton is fairly well preserved with significant erosion of the cancellous bone of the hands and feet, right *os coxae*, and scapulae. The forearm bones are splintered. The bone is fragile and soft. Color is mottled tan-brown-yellow-grey and fairly uniform. Grey dirt adheres to some bones. The hand and foot bones have a porcelain ring.

Associated human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the appendicular skeleton. Slight extension of the first metatarsal proximal facet. Laminal spurring of the eighth through the twelfth thoracic and the lumbar vertebrae. A small parturition pit on the left pubic ramus suggests childbirth.

Noteworthy features: Squatting facets of the distal right tibia and the right talus.

Comments: Excavators recorded the mandible as present, but no mandible was identified in the laboratory. Aging: Pubic symphysis McKern Σ6 29.6±4.43; Todd III 22-24; Suchey II 25.0±4.9; Auricular surface II 25-29; Sternal rib end II 17.4±1.52. Radiographs: left femur.

Burial No.: BCES 70

Archaeological Context: Early Period II - IV, square D4, southwest quadrant, layer 29, NNW 330°. Supine, extended, primary burial whose lower body is in the south baulk.

Age: 3 - 4 years (dental eruption, diaphyseal length).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and skull. The skull is missing portions of the sagittal suture, bregma, occipital, sphenoid and maxilla. The mandible is missing the right inferior body. The deciduous dentition is complete. Infracranial remains include the clavicles, humeri, bilateral scapular fragments, left radial head, ribs bilaterally, cervical, thoracic and lumbar vertebral arches.

Preservation: Good - Fair. The skull was incompletely reconstructed from small fragments, but the face could not be restored to the vault. The teeth are well preserved. The bone color is mottled brown, grey and yellow in the skull, and tan and brown in the infracranial remains. Texture is smooth. There is a porcelain ring to the remains.

Associated cultural/faunal remains: None.

Associated human remains: None.

Dental pathology: Dental wear of the enamel with very slight exposure of the dentin in the anterior teeth. The mandibular canines have oval-shaped carious lesions in the anterior labial crowns. The left canine has a very irregular defect of the anterior labial crown which has undercut the outer enamel layer. The dentin is exposed and is stained black. The right canine has a similar defect, not quite as large, and the dentin exposure is white. The maxillary lateral incisors have semi-circular carious lesions of the lingual surface of the crown. The mandibular central incisors have rectangular areas of outer enamel loss linearly across the top of the teeth without exposure of the dentin. The mandibular molars have a light brown stain, especially on the lingual surface of the crown. The maxillary teeth are heavily stained on the labial side of both molars with a dark brown stain on the maxillary lateral incisors.

Cranial pathology: None noted.

Skeletal pathology: None noted.

Noteworthy features: The humeri appear quite robust for the age of the individual.

Comments: Photographs: dental defects and staining.

Burial No.: BCES 71

Archaeological Context: Middle Period VII, D4/D5 baulk, layer 15, DBDP 2.36 m (legs), N 355°. Disturbed supine burial with only lower limbs remaining, along side Burial 73. A large circular hole cuts through the femora. Potsherds on either side of the legs.

Age: Young adult (osteoarthritis).

Sex: ?Male (robusticity and long bone length).

Stature: 164.4 ± 4.5 cms (5' 4¾") [left tibia].

Completeness: Partial lower limb skeleton. Present are the right distal femur, the tibiae, the right missing the distal end, the fibulae missing the right distal half and the left proximal articular end, the left foot missing the medial and distal phalanges, the right calcaneus, first metatarsal and first cuneiform, and a few hand phalanges.

Preservation: Good. There is old breakage of the femur, and weathering of the epiphyseal bone of all long limb bones and tarsals. The distal right fibula has a fresh break. No reconstruction is possible. Bone color is uniformly brown. Bone is coarse in texture, and with a porcelain ring. The feature does not account for all missing bone.

Associated human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the appendicular skeleton. The nutrient foramina are enlarged in the distal femur and proximal tibiae. Smooth-walled lytic lesion of the lateral condyle of the left first metatarsal phalanx. The bone is porotic at the base of the defect, but there are no signs of an infection or advanced osteoarthritis. The first metatarsals have extended facets of the distal articular surfaces with porosis and lipping of the facet extension.

Noteworthy features: Squatting facets of the left distal tibia and talar facets.

Comments: Photographs: first metatarsal phalanx. Radiographs: left tibia.

Burial No.: BCES 72

Archaeological Context: Early Period II - III, square D4, southwest quadrant, layer 30, DBDP 4.05 m (skull), NNW 330°. Supine, extended, primary burial somewhat disarticulated, with a few small pots. Feet are in the south baulk.

Age: 35 - 40 years (cranial suture fusion, auricular surface, pubic symphysis, sternal rib end, dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 166.2 ± 4.0 cms (5' 6") [left femur].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing the hyoid, the mandibular condyles, two teeth, and portions of the superior maxilla. The infracranial remains are missing the carpals, hand phalanges, most sternal rib ends, left patella, left navicular, first two cuneiforms and metatarsals, right fifth metatarsal, and most foot phalanges.

Preservation: Good. The cranial vault was reconstructed. Some reconstruction required of most elements, but the long limb bones are complete. The vertebral bodies, scapula blades, and *os coxae* are weathered. Bone color is an uniform mottled dark grey-brown. Bone texture is coarse. The bones have a porcelain ring.

Associated human remains: A single distal femoral shaft fragment from the end of the *linea aspera.*

Dental pathology: A single neck caries in the maxillary left third molar is present. Dental wear exposes the dentin in all teeth and the pulp in the first molars of both jaws. There is slight roughening of the enamel of the maxillary right canine. Slight rolled rim and slight alveolar resorption. There is postdepositional chipping of the mandibular right first molar, left second molar, and the maxillary right second molar. The mandibular anterior teeth are crowded. The maxillary left lateral incisor is counter-winged.

Cranial pathology: Bilateral tympanic dehiscence. No evidence of porosity or thickening of the vault. Slight porosity of the suprameatal area of both temporals.

Skeletal pathology: Slight osteoarthritis of the vertebrae and appendicular skeleton. Complete fusion of the right first metatarsal, proximal phalanx, and two sesamoid bones which appears congenital. Laminal spurring of the thoracic and lumbar vertebra.

Noteworthy features: Double calcaneal facet, huge suprascapular notches, lambdic wormian bones, the clavicles are extended posteriorly at the distal curve (insertion of the deltoid). Enlarged medial tubercle of the calcaneus bilaterally. Robust and well marked entheses of all bones, deep grooves in the posterior talus.

Comments: The mandible and maxilla were displayed in the exhibition "Ban Chiang: Discovery of a Lost Bronze Age." Aging: Pubic symphysis McKern Σ12 29.2±3.33; Todd VII-VIII 35-44; Suchey IV-V 35.2±9.4/45.6±10.4; Auricular surface IV-V 35-45; Sternal rib end V 38.8±7.00; Cranial suture closure post. Σ=8 =39.4±9.1, ant. Σ=2 =36.2±6.2. Photographs: right first metatarsal fusion, clavicle, tibia and fibula, calcaneal facet, skull, mandible, tooth wear. Radiographs: right humerus, left ulna and radius, left tibia, left fibula, left femur, left first metatarsal, cranium.

Burial No.: BCES 73

Archaeological Context: Middle Period VII; square D5, southeast quadrant, layer 18; square D4, north quadrants, layer 18; and D4/D5 baulk, layer 15; DBDP 2.31 m (skull), S 170°. Supine burial with pottery sherds. Originally identified as two burials (Burial 18 and Burial 73), found to be a single burial separated by a large trench disturbance.

Age: 35 - 40 years (ectocranial suture fusion, dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 169.7 ± . cms (5' 6¾") [right humerus].

Completeness: Partial skull, upper infracranial skeleton and feet. The skull is represented by the mandible missing the right central incisor and third premolar postmortem, the left temporal, occipital, nearly complete parietal, and fragments of the frontal. Infracranial remains include clavicles, scapulae, right humerus, first, second, and seventh cervical vertebrae, the first through the eleventh thoracic vertebrae, ribs bilaterally, sternum, manubrium, right hyoid horn, left foot missing the talus, calcaneus and cuboid, and the right foot missing the talus, calcaneus, second, third and fifth metatarsals.

Preservation: Good. Although the remains are fragmentary, bone preservation is good. The cranium and mandible were reconstructed. Reconstruction of fresh breakage of the humerus, clavicles and ribs was required. There are insufficient fragments to complete restoration. Bone color is uniformly brown and texture is coarse. There is a green-grey tinge to the right second cuneiform. There is a small circular red stain on the left humeral capitulum. The bone has a porcelain ring.

Associated human remains: Small cranial vault fragment of an infant and an adult upper thoracic vertebra.

Dental pathology: There is moderate calculus formation on the lingual side of the mandibular teeth. Slight rolled rim and slight resorption are noted in the posterior alveoli. Dental wear exposes the dentin in all the teeth. The molars are worn flat.

Cranial pathology: The right posterior superior orbit has coarse (0.1 - 0.5 mm) cribra orbitalia, which appears to be healing but the porosity has not filled in. The area is not raised. Cranial vault thickness ranges from 5 - 9 mm. The left hyoid horn has a healed fracture near the distal end; with slight malalignment and a well remodeled cortex.

Skeletal pathology: The anterior surface of the left scapula at the glenoid fossa exhibits an eroded, roughened semi-circular "facet" which is porotic and slightly lipped. There is evidence of healed reactive bone. Radiograph of the scapula shows a small osteophyte on the inferior surface of the glenoid without sclerosis. These changes are consistent with a recurrent or chronic anterior dislocation of the humerus, where the head is wedged beneath the coracoid process. The fifth and sixth thoracic vertebral bodies and lamina are completely fused with no intervening disc or articular spaces. The two vertebrae appear normal in size and shape, suggesting that this may be a congenital fusion. The first ribs bilaterally have an eroded area on the lower surface of the neck from the head to the tubercle. The bone is healed cancellous bone with an irregular surface. The left fifth metatarsal has a flattened and porotic tubercle. The articular facet appears intact and with slight arthritic lipping. The tubercle has been flattened and is markedly porotic. The fifth metatarsal tuberosity, for attachment of the *peroneus brevis* muscle (for extension of the foot), may be avulsed in a Jones fracture, which is a possible cause of the changes noted here. Degenerative changes in the skeleton include laminal spurring of the thoracic vertebrae, and slight osteophytosis of the vertebral rims. There is slight lipping of the cervical vertebral articular facets, with moderate degenerative changes in the third and lower thoracic facets. Vertebral articular facet changes suggest a loss of disc height in the first and second thoracic interface. Appendicular osteoarthritis is slight overall, but with moderate osteophytic lipping of the right and left clavicles, and the left glenoid.

Noteworthy features: The clavicles are asymmetric in length and robusticity, the left side being longer and narrower, possibly secondary to the shoulder dislocation. Radiograph of the clavicles demonstrates no apparent abnormality. Both scapulae have huge suprascapular notches. Asterionic bone, multiple mandibular foramina.

Comments: Aging: Sternal rib end IV 28.2±3.83; Cranial suture closure post. $\Sigma \geq 3$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Excavators associated cranial and upper body material from square D4, NWQ, Feature 3/layer 18. Two teeth previously associated with Burial 20A are assigned here. Right lateral clavicle, rib fragments, fourth thoracic vertebra were added from Bag #2326 [square D4, north section wall cleaning]. Photographs: scapula, right first rib, left fifth metatarsal, cribra orbitalia, fifth and sixth thoracic vertebrae, clavicles, first metatarsal, hyoid horn, glenoid. Radiographs: clavicles, scapula.

Burial No.: BCES 74

Archaeological Context: Early Period I - III, square D4, southeast quadrant, layer 30, DBDP 4.20 m (skull), NNW 328°. Supine extended primary burial with a pot by the left elbow. The lower body from the elbows down lies in the south baulk.

Age: Late middle-aged to old (dental wear).

Sex: ?Male (clavicle size).

Stature: Cannot be determined.

Completeness: Fragmentary skull and upper skeleton. The skull is represented by the left mandibular body and the right anterior body to the right fourth premolar, two loose molars, and eleven fragments of the vault. Infracranial remains include four vertebral body fragments, six rib fragments, left distal humeral shaft fragments, distal shafts of the clavicles, and a scapula fragment.

Preservation: Poor. No reconstruction was possible. The teeth have broken off at the roots and are lost. The bone is extremely fragile, coarse, weathered, worn, soft, and without evidence of mineralization. Bone color is grey.

Associated human remains: None.

Dental pathology: Premortem loss and healing of the mandibular left third premolar and right fourth premolar. The left third molar may have been lost more recently as the socket is still present but is resorbing. There are interproximal caries in the right first and second molars. Dental wear exposes the dentin in available teeth. Calculus is slight, alveolar resorption is slight to moderate.

Cranial pathology:

Skeletal pathology:

Noteworthy features: Proximal mylohyoid bridge.

Comments: Photographs: mandible, tooth wear.

Burial No.: BCES 75

Archaeological Context: Middle Period VII, D4/D5 baulk, layer 17, DBDP 2.56 m (humerus), NNW 348°. Disturbed supine burial with only upper infracranial remains recovered.

Age: Young adult (epiphyseal fusion and osteoarthritis).

Sex: ?Female (humeral head diameter and infracranial bone size).

Stature: 154.9 ± . cms (5' 1") [right humerus].

Completeness: Partial upper infracranial skeleton. Present are the lateral border of the right scapula, the right humerus, right proximal ulnar fragment, left proximal humerus and distal epiphysis, right first through tenth ribs, three left rib fragments, fifth through the twelfth thoracic vertebrae, and the first lumbar vertebra.

Preservation: Good. Slight reconstruction of the ribs required. There are no additional fragments for missing sections. Weathering loss of the vertebral bodies and sternal rib ends. The bone is uniformly orange-tan in color and smooth in texture. There is a porcelain ring to the bones.

Associated human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Slight osteoarthritis of the distal right humerus. Laminal spurring of the lower thoracic vertebrae.

Noteworthy features: Septal aperture of the right humerus.

Comments: Photographs: distal humerus. Radiographs: right humerus.

Burial No.: BCES 76

Archaeological Context: Early Period III, D6/D7 baulk, layer 27, DBDP >3.65 m. Flexed burial with a bronze socketed spear point and a beaker vessel.

Age: 25 - 30 years (auricular surface, sternal rib end, and pubic symphysis morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 163.0 ± 4.0 cms (5' 3½") [left femur].

Completeness: Nearly complete infracranial skeleton and skull. The skull is missing two maxillary and two mandibular teeth, the mandibular condyle on the left and coronoid on the right, the superior maxilla, right occipital condyle, sphenoid, and the naso-frontal area. The infracranial remains are missing the manubrium, scapular blades, most sternal rib ends, the first and sixth cervical vertebrae, the twelfth thoracic and first lumbar vertebrae, most carpals, three left tarsals, and most hand and foot phalanges.

Preservation: Good. Most long limb bones required only minimal reconstruction. The cranial vault was reconstructed from large fragments. The face and mandible could not be restored. The vault cortex is exfoliating in thin sheets. Most cancellous bone is weathered, compressed and worn. The vertebrae and feet are well preserved. Bone color is uniform, mottled, grey-brown. Black spots occur on the left proximal tibia, right distal femur, and right patella.

Additional human remains: A single cranial vault fragment.

Dental pathology: Premortem loss of the mandibular left third molar. The mandibular right second molar has been lost to caries, the roots are *in situ*. There are occlusal caries in the remaining mandibular molars and the maxillary left third molar. Slight calculus on most teeth. Coarse pitting enamel hypoplasias on the maxillary canines. Attrition is to the dentin in the anterior teeth and the first molars, and wear is slight in the premolars and posterior molars. There is a light brown stain on the maxillary teeth on the occlusal and labial surfaces and on the occlusal surfaces of the mandibular teeth. Crowding of the mandibular incisors.

Cranial pathology: There is an area of coarse cortical bone (21 x 16 mm) at the left pterion region of the frontal. There are no obvious changes endocranially, and the outer cortex has exfoliated making description difficult. Cranial thickness measurements range from 5 - 10 mm.

Skeletal pathology: Slight osteoarthritis of the appendicular skeleton and vertebral articular facets. There is a large tubercle-like osteophyte to the lateral side of the anterior surface of the *sustentaculum tali* of the left calcaneus. There is no adjacent tubercle on the cuboid. Possible incipient tarsal coalition. An osteophyte on the inferior third cuneiform on the left extends distally at the insertion site of the *tibialis posterior* and the *adductor hallucis*. There are erosive lytic lesions of the distal left fibula and left humerus. The distal left humerus has a small circular erosive defect (4 x 4 mm) with rounded smooth edges on the anterior surface, just above the coronoid. The interior of the defect is smooth with large trabeculae, and no sign of reactive bone. The left fourth metacarpal has a well healed fracture of the proximal shaft. There is no medial-lateral angulation. There is dorsovolar angulation (apex dorsal) of approximately 38°. The shaft has a small osteophyte formed on the dorsal side. The area is well remodeled. Radiograph documents complete healing with restoration of the marrow cavity. The tali have very deep talar sinuses on the inferior surface between the head and the calcaneal surface.

Laminal spurring of the thoracic and lumbar vertebrae. Enlarged nutrient foramina at the lateral midshaft in the left second and third metatarsals.

Noteworthy features: Third trochanter of the femur. Extremely winged central maxillary incisors. Squatting facets of the distal tibiae and tali. The clavicles are extended posteriorly at the distal curve (insertion of the deltoid), similar to B. 72.

Comments: Aging: Pubic symphysis McKern $\Sigma 8$ 24.1±1.93; Todd V 27-30; Suchey III 28.7±6.5; Auricular surface II 25-29; Sternal rib end III 25.9±3.50; Cranial suture closure post. $\Sigma \geq 0$ $\geq$30.5±9.6, ant. $\Sigma \geq 0$ $\geq$32.0±8.3. Photographs: left second and third metatarsals, tali, vertebrae, calcaneus, left humerus, left distal fibula, maxilla. Radiographs: tali, vertebrae, left humerus, right fibula, right radius, left ulna, right tibia, right femur, left fifth metacarpal, cranium, mandible.

Burial No.: BCES 77

Archaeological context: Early Period III - IV, square D6, northeast quadrant, layer 29, DBDP 3.27 m (pot), NNW/SSE. Jar burial under the toes of Burial 31.

Age: Newborn - 1 month (diaphyseal length).

Sex: ?Female (iliac morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton and skull. The skull is represented by the mandible, maxilla, unerupted deciduous tooth caps, left zygoma, *pars basilaris*, sphenoid, and a few vault fragments. The infracranial remains are represented by the right scapula, right clavicle, humeri, radii, fragments of the ulnae, right ischium, ilium and pubis, femora, proximal right tibia and fibula, first metatarsals and two metatarsal shafts, some metacarpals, few ribs bilaterally, and cervical vertebrae.

Preservation: Good - Fair. The mandible halves and cervical vertebrae are well preserved and intact. There is significant weathering loss of the metaphyses of the long limb bones, and the cranial vault is fragmented and incomplete. The bone color varies by element from very light tan to dark tan. There is brown staining of the left mandible and maxilla. There is a porcelain ring to the mandible.

Additional human remains: Two fragments of the cranial vault from an older individual.

Dental pathology: None noted.

Cranial pathology: Porosity of the *pars basilaris*, zygoma, and the alveolar portions of the mandible and maxilla. The cranial vault bones appear finely porotic with some remodeling of the exterior surface. The *pars basilaris* porosity appears to be remodeling appositional growth. Distinctive layers can be seen on cross-section, suggesting an infectious etiology rather than anemia.

Skeletal pathology: None noted.

Noteworthy features:

Comments: The *pars basilaris* is small for age.

Burial No.: BCES 78

Archaeological context: Middle Period VII, D4/D5 baulk, layer 16, feature 2, DBDP 2.47 m (humerus). Jumbled remains disturbed by ditch, but designated a burial by J. White in 1993, since bones recovered probably represent a single individual.

Age: Middle-aged (osteoarthritis).

Sex: ?Male (infracranial bone measurements).

Stature: 161.3 ± . cms (5' 3½") [right radius].

Completeness: Partial infracranial skeleton. Present are a fragment of the right scapula, distal right humerus, right radius, right ulna, missing the distal end; a few rib fragments, sixth cervical vertebra, the lumbar vertebrae, and sacrum.

Preservation: Good. Old breakage of the scapula, humerus and ulna. The radius was reconstructed. Very little weathering loss of the vertebrae. The lower lumbar vertebrae and sacrum are a good match and other remains seem consistent with a single individual. Bone color is a uniform brown with grey dirt adherent to some elements. The cervical vertebra and rib fragment are slightly lighter in color. The bones have a porcelain ring.

Additional human remains: None.

Dental pathology:

Cranial pathology:

Skeletal pathology: Moderate to marked osteoarthritis of the apophyseal joints of the lumbar skeleton. Slight osteophytosis of the lumbar bodies. Slight osteoarthritis of the appendicular skeleton. Laminal spurring of the lumbar vertebrae.

Noteworthy features: Lumbarization of the first sacral element.

Comments: Photographs: sacrum, lower lumbar vertebrae.

Burial No.: BCES 79

Archaeological context: Early Period III - IV, D6/D7 baulk, layer 22, Bag #2832, Feature 6A, DBDP 3.47 m. Concentration of disturbed and disarticulated human bone, cut by Burial 62, designated as a burial by J. White in 1993. Remains of three individuals identified in the laboratory.

Age: ?Middle-aged (dental wear and osteoarthritis).

Sex: ?Female (cranial and *os coxae* morphology).

Stature: 156.2 ± 3.5 cms (5' 1") [Right tibia].

Completeness: Partial skull and infracranial skeleton. The skull is represented by the left mandible, maxilla missing the left incisors and right central incisor, zygomas, and temporals. The infracranial remains include the right scapula at the glenoid, right distal humeral shaft fragment, left humerus missing the condyles, right radius and ulnar shafts, right subtrochanteric area of the femur, left femoral shaft missing the head, greater tuberosity and medial condyle, left tibia missing the distal end; right tibia missing the proximal end, left talus, right second metatarsal, and *os coxae* fragments.

Preservation: Fair. Some reconstruction of the face and long limb bones but none are complete. Old breakage and weathering of all surfaces. There are insufficient fragments for missing material. The remains appear to be a good match for a single individual. Bone color is tan and texture is coarse, with some porcelain ring.

Additional human remains: The left femur and fibulae, missing the proximal ends of an adult male [Burial 79A]. The left femoral midshaft, left ulnar shaft, a thoracic vertebra, and a cranial vault fragment of a subadult [Burial 79B].

Dental pathology: Premortem loss of the maxillary left second and third molars, right lateral incisor, and mandibular left third molar, and possibly the left lateral incisor, with complete remodeling of the alveolus. Calculus is slight on the left mandibular teeth and moderate on the maxillary dentition. Alveolar resorption is moderate in the maxilla and slight in the left mandible. Dental wear exposes the pulp in most teeth. Apical abscessing in the maxillary third premolars and the mandibular second molar. Premortem chipping of the maxillary third premolar bilaterally.

Cranial pathology: Tympanic dehiscence and coarse porosis of the external auditory meatus and suprameatal triangle.

Skeletal pathology: Moderate osteoarthritic lipping of the right glenoid and left humeral head. Preauricular sulcus of the right *os coxae* indicates childbirth.

Noteworthy features: Bilateral septal aperture in the humerus. Squatting facet of the distal right tibia.

Comments: Photograph: mandible and maxilla.

Burial No.: BCES 79A

Archaeological context: Early Period III - IV, D6/D7 baulk, layer 22, Bag #2832, Feature 6A, DBDP 3.47 m. Sorted from Burial 79.

Age: Adult (epiphyseal fusion and bone size). **Sex:** ?Male (infracranial bone size).

Stature: 173.7 ± 5.4 cms (5' 8") [left femur].

Completeness: Incomplete leg long limb bones. Present are the left femur missing the lateral condyle and a portion of the head, and the fibulae missing the proximal ends.

Preservation: Fair. All bones have post-depositional weathering and breakage. No reconstruction possible. Bone color is grey-tan and there is a porcelain ring.

Additional human remains: Burials 79 and 79B. **Dental Pathology:**

Cranial Pathology: **Skeletal Pathology:** None noted.

Noteworthy Features: **Comments:**

Burial No.: BCES 79B

Archaeological context: Early Period III - IV, D6/D7 baulk, layer 22, Bag #2832, Feature 6A, DBDP 3.47 m. Sorted from Burial 79.

Age: 7 - 10 years (infracranial bone size). **Sex:** Unknown.

Stature: Cannot be determined.

Completeness: A fragment of the parietal is present, unknown side. The left radial shaft missing the ends, the left femur missing the ends, and a single vertebral body are present from the infracranial skeleton.

Preservation: Poor. Incomplete and fragmentary. There are no additional fragments, so no reconstruction was possible.. Bone color is tan and there is a porcelain ring.

Additional human remains: Burials 79 and 79A. **Dental Pathology:**

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Age estimated by comparison of bone size with B. 55 and B. 62.

Burial No.: BCES 80

Archaeological context: Middle Period VII, square D4, southeast quadrant, layer 17, feature 5, DBDP 1.93 m (femur), probably S. Also includes Bag #1893 [East Section cleaning "probably SEQ"]. Since remains appear near their *in situ* position, though disturbed, designated a burial by J. White in 1993.

Age: 3 - 5 years (dental eruption and diaphyseal length).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton and skull. The skull is represented by a nearly complete mandible, missing the anterior deciduous dentition and the left condyle; portions of the frontal, parietals and occipital, the left temporal, and right maxillary fragment. The infracranial remains include the left humeral diaphysis, left fibula diaphysis, left ulna diaphysis, five vertebral arch fragments, three vertebral bodies and some rib fragments.

Preservation: Good - Fair. The mandible is nearly complete. The parietal bone fragments are flattened and warped. The cranial vault could not be restored. The infracranial remains are incomplete and fragmentary, little reconstruction was possible. Bone color is black mottled with tan, with a smooth texture. There is a blue-green stain on the distal end of the fibula. The unerupted maxillary permanent first molar crown is tan in color.

Additional human remains: None.

Dental Pathology: There is a semicircular area of the right maxillary deciduous canine with decreased enamel formation, but the dentin is not exposed. Wear in the mandibular deciduous teeth exposes the dentin in the canine and incisor, and the enamel in the molars.

Cranial Pathology: None noted.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Photograph: mandible.

Burial No.: BCES 81

Archaeological context: Early Period III - IV, square D6, northwest quadrant, layer 29, DBDP >3.35 m, NNW/SSE. Bones recovered from a grave cut but not drawn in field illustrations.

Age: Adult (infracranial bone size).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Two lower limb long bone fragments. Fragment of a twelfth rib, femoral midshaft fragment and a small proximal fibular fragment.

Preservation: Poor. Incomplete and fragmentary. No reconstruction possible. There is old breakage of the distal end of the femoral fragment and the proximal end of the fibular fragment, and newer breakage of the proximal end of the femoral fragment. The femoral fragment is cracked longitudinally and coarse. The bones have a reddish stain, and there is black mottling of the proximal femoral shaft. Bone texture is coarse.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Photograph: mandible.

Burial No.: BCES 82

Archaeological context: Early Period V, square D4, west quadrants, surface of layer 27. Bag #2386. Skull in sidewall where the rest of the skeleton presumably lies. Near B. 61.

Age: Middle - old age (dental wear and tooth loss).

Sex: Male (cranial morphology).

Stature: Cannot be determined.

Completeness: Incomplete skull. The mandible is missing the right posterior ramus and condyle. The maxilla is missing two teeth. The right frontal at the coronal suture, the edges of the left parietal, most of the occipital, and the sphenoid are missing.

Preservation: Good - Fair. The mandible and face are well preserved and reconstructed. Vault fragments could be reconstructed but the vault could not be restored. There are insufficient fragments to complete reconstruction. Bone color is orange-tan. Bone texture is solid, but some areas are weathered, and many of the breaks are old. There is a slight porcelain ring.

Additional human remains: None.

Dental pathology: Premortem loss of the mandibular left molars and right second molar, and the maxillary left third molar with incomplete resorption of the socket. Abscessing in the sockets of the maxillary right first molar, fourth premolar and left fourth premolar. Caries in the mandibular incisors and canines. Calculus is slight. Periodontal disease ranges from slight to marked. Dental wear exposes the pulp in many teeth.

Cranial pathology: There is evidence of a healed fine porosis of the superior right parietal. The cortex feels slightly irregular and small perforations (<0.01 mm) are still visible. At a break, thinning of the interior and exterior tables with an increase in diplöe thickness can be observed. Cranial thickness measurements range from 5 - 7 mm.

Skeletal pathology:

Noteworthy features:

Comments: Photographs: dental wear, abscessing, caries, porosis of the right parietal.

NON NOK THA 1966 BURIAL DESCRIPTIONS

The Non Nok Tha burial descriptions follow a similar format to the Ban Chiang descriptions, with the exception of the archaeological context information. The provenience information for the 1966 excavation series is summarized below:

Archaeological Context: Brief summary of provenience data, portion of the burial recovered by the excavators, associated artifacts, as well as *in situ* measurements of individual bones if made. Provenience information includes:

Period: Assigned by Parker (in press). A ? indicates a doubtful assignment.
Excavation square: A letter and number designation (e.g. square C4).
Quadrant: The quadrant of the square (e.g. northwest quadrant).
AD: Absolute Depth.
Orientation: Directional orientation of the head of the burial (abbreviated by capital letters).

Note: Previous publication of data derived from the 1966 Non Nok Tha skeletal remains (Pietrusewsky 1974) necessitates an attempt at reconciliation of the current analysis with the published record. As described in the Samples and Methods section of this dissertation, this reconciliation is complicated by the assignment of new "skeleton" numbers to the remains rather than use of the field numbers, storage of the remains by field number, the length of time and conditions of storage, and the movement of the remains (at least once) from one building to another. To assist any reader interested in equating descriptions presented here with the Pietrusewsky publication, the "Pietrusewsky skeleton" numbers are provided in the Comments section, along with any other relevant information.

Burial Number: 1966 - 1: Number not used.

Burial Number: 1966 - 2

Archaeological Context: Middle Period 2, square C3, east quadrant, AD 125 cm, orientation W. Supine, skull facing up, arms alongside trunk, upper body disturbed by posthole and remainder unexcavated. Mound offerings (sandstone rock, polished stone bracelet fragment, bone fish gorge, *bibos* leg, *sus* mandible, *cervus* leg) placed beyond head.

Age: 40 - 45 years (auricular surface).

Sex: Female (cranial and *os coxae* morphology).

Stature: 152.9 ± . cm (5' ¼") [right ulna].

Completeness: Fragmentary skull and partial infracranial skeleton. The skull is represented by the frontal, left parietal at the coronoid suture, right parietal at the lambdoidal suture, right mandibular ramus, left condyle, and left canine and premolars. The infracranial skeleton includes the right clavicle missing the distal end, right humeral shaft, right ulna missing the styloid, radial shafts, most hand bones, innominate fragments, femoral shafts, lower thoracic vertebrae, sacrum, and left calcaneus.

Preservation: Fair. The frontal is reconstructed. The tooth roots are brittle and cracking. Cranial endocranial surface is extremely weathered. Many of the ends of the long bones have been lost. There are few additional fragments; most of the breakage is old. The ribs are fragmentary. Some repair of the long limb bones but none complete. The bone is mottled black with a porcelain ring.

Additional human remains: None

Dental Pathology: Three loose teeth are recovered. Wear exposes the dentin. There is a slight coarsening of the lateral labial crown surface of the maxillary canine, no measurement could be made. Light brown stain on the outer surface of the canine and premolar which covers the lower crown.

Cranial Pathology: Cranial vault thickness measurements range from 8-11 mm. Cross-section appears that outer cortex is thickened but there is extensive wear of the interior surface. The left mandibular condyle is slightly more flattened than the right posteriorly. Cribra orbitalia is present in both orbits. The left greater than the right, but both are nearly healed. The area looks like worm tracks.

Skeletal Pathology: Slight osteoarthritis of the hands and feet. The vertebrae have slight osteoarthritis of the facets. The bodies are difficult to evaluate. The second or third thoracic vertebra has a widely excavated rib facet. The bone is remodeled in the center of the lesion, with no reactive bone formation surrounding the defect. The vertebra is incomplete. Radiograph of the vertebra demonstrates a small (5 x 7 mm), circular demineralized lesion anterior to the pedicle with poorly demarcated margins, and a sclerotic posterior margin. Possible tuberculosis. The clavicles have an inferior extension of the conoid tubercle which is sharply contoured, without reactive bone formation.

Noteworthy Features: Two small, parallel cut marks (5 mm) are noted on the left mid-frontal.

Comments: More complete than Pietrusewsky Skeleton #10. Aging: Auricular surface V 40-50. Photographs: vertebral facet, cribra orbitalia. Radiograph: thoracic vertebra.

Burial Number: 1966 - 3: Mound with no skeletal remains detected.

Burial Number: 1966 - 4

Archaeological Context: Middle Period 4, square C3/C4 and C3, AD 115, orientation S-SE. Burial supine with hands along pelvis, upper portion of the body removed by Burial 34. Two pottery vessels and an *bibos* leg at feet.

Age: 35 - 40 years (auricular surface morphology).

Sex: Female (*os coxae* morphology).

Stature: 155.9 ± 5.2 cm (5' 1½") [segment left femur].

Completeness: Partial infracranial skeleton. Infracranial remains include the left distal humerus, forearm bones, few hand bones, fragments of the *os coxae*, femoral shafts with the heads but no distal ends, tibial shafts, fibulae shafts, tali, calcanea, right proximal third fourth and fifth metatarsals, left metatarsal shafts, vertebrae include partial first and second, two cervical, six thoracic, five lumbar and sacrum, few rib fragments, and manubrium.

Preservation: Fair - Poor. All of the ends of the long limb bones are weathered and nearly lost. The vertebrae are well preserved. Reconstruction of the long limb bones was necessary. Substantial rocky concretions result in unidentifiable fragments. Multiple cleaning and scraping marks on all bones. Bone color is tan with some brown mottling. The bones do not have a porcelain ring.

Additional human remains: Fragments of the proximal and complete distal end of the left radius.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: The lumbar vertebral bodies are well preserved, but the neural arches are missing post-depositionally. The fifth lumbar vertebra is complete with superior articular facets and transverse processes. The inferior surface of the right facet is stained and coarse and maybe the result of *spondylolysis*. The left *pars interarticularis* is freshly broken. Slight osteoarthritis of the vertebral and appendicular skeleton. Schmorl's nodes, appearing as grooves in the superior and inferior surfaces of the ?fourth, tenth and eleventh thoracic vertebrae. Preauricular sulci indicating childbirth.

Noteworthy Features: The ulnae are very robust.

Comments: Appears to match Pietrusewsky Skeleton #1: Pietrusewsky states "skull removed by Burial 34 and extra skull at feet". Skull was not located in 1993. Aging: Auricular surface IV 35-39.

Burial Number: 1966 - 5: Only skull in excavation area, apparently not examined by Pietrusewsky. Not found in 1993.

Burial Number: 1966 - 6

Archaeological Context: Early Period I, square C4/D4 and C4, AD 200 cm, orientation NE. Bones in poor condition. Skull and left leg missing, remainder of skeleton supine and apparently somewhat disarticulated. String of shell disc beads on waist. Large vessels placed in apparent corners of grave pit. Additional vessels at feet with animal remains. Also associated a polished stone adze, flaked stone scraper and sharpening stone.

Age: Adult (infracranial bone size).

Sex: Male (infracranial bone morphology).

Stature: 163.6 ± . cm (5' 4½") [right humerus]

Completeness: Partial infracranial skeleton. Present are the complete right humerus, right ulna missing the distal end, left humeral shaft, left ulna missing the styloid, left proximal clavicle, left proximal radius, rib head fragments from both sides, femoral condylar fragment, *os coxae* fragments, and scapula blade fragments.

Preservation: Good-Fair. The right humerus was completely reconstructed. Some reconstruction of the rib fragments was possible but not done. Bone color is tan with some gray mottling. Bone texture is coarse with some concretions on the forearm bones and rib fragments.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the elbow and rib facets.

Noteworthy Features: The ulnae have perpendicular cut marks on the proximal shaft. The posterior surface of the right ulna, at the level of the greatest transverse diameter, has multiple short (up to 10 mm), slash-like cut marks perpendicular to the long axis of the bone (approximately 15 marks). The left ulna has six marks, three quite small, on the medial border of the proximal end of the bone. There are also cleaning marks on these bones which are easily distinguishable.

Comments: Found in 1993 as intrusive in Burial 62, but associated small beads in adherent dirt suggests belongs here. Small disc beads with a hole in the center and larger sized beads found with skeletal material. Not sure of corresponding Pietrusewsky Skeleton 64 or 53. Radiograph: right humerus.

Burial Number: 1966 - 7

Archaeological Context: Middle Period 5??, square C4/C5, orientation NW. Apparently supine, fragments from legs up to skull recovered. Forty-eight shell disc beads recovered from around neck.

Age: 6 - 8 years (dental eruption).

Sex: ?Female (ilium and mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial infracranial skeleton. The skull is missing portions of the frontal, parietals, and face, the left mandibular condyle, right coronoid, and the bilateral deciduous lateral incisor. Infracranial remains are missing the right clavicle, scapula, humeral heads, end of the left humerus, left ischium, pubis, left tibia, patellae, fibulae, feet, the mid-thoracic vertebrae, most hand bones, most ribs, manubrium, and sternal elements.

Preservation: Fair. Good preservation of mandible. Some reconstruction of the skull attempted but incomplete. Hard concretions on the anterior of the cranial vault. The vertebrae are preserved *en bloc*. None of the epiphyses except the femoral heads are preserved. The ends of the diaphyses are mostly missing. The vertebrae and ribs are poorly preserved, soft and fragile bone. The bone color ranges from tan to dark grey, texture is smooth. There is slight fossilization or mineralization of the bone.

Additional human remains: Fragment of an adult right maxilla with the fourth premolar and third molar *in sit*, scapula fragment at the acromion process, great toe proximal phalanx and long bone shaft fragments.

Dental Pathology: Slight dental wear of the permanent molars. There is wear to the dentin in the deciduous canines and first molar and small dots of dentin exposure in the deciduous second molars. The unerupted permanent teeth have a very pale tan-brown stain on all surfaces.

Cranial Pathology: Cranial vault is 9 mm thick at the mid-frontal.

Skeletal Pathology: None noted.

Noteworthy Features: A fragment of the right tibial midshaft, from just inferior to the tibial tuberosity to the midshaft, has eight cut marks, 3-9 mm in length, perpendicular to the long axis of the bone, and of uniform depth, on the medial surface. On the posterior surface of the same fragment there are additional cut marks of less depth. No cut marks are noted on the right femur fragment, but more than nine cut marks, of 5 mm length, are noted on the anterior distal and superior posterior shaft of the left femur fragment.

Comments: Appears to match Pietrusewsky Skeleton #81.

Burial Number: 1966 - 8

Archaeological Context: Middle Period 1?, square C5/D5, AD 135 cm, orientation ?E-W. Main burial apparently in shallow grave covered with extensive and richly furnished mound, but position not accurately recorded. Skeleton is substantially complete except for the face. Much pottery, two spindle whorls, two rubbing stones, bifacial grindstone, worked bone fragment are among the mound goods. A human skull (PS #26), fragments of a second skull (PS #58) and fragments of a third individual (PS #71) found in mound.

Age: 55 - 60 years (auricular and pubic symphysis morphology and cranial suture fusion).

Sex: Female (cranial and *os coxae* morphology).

Stature: 154.7 ± 3.5 cm (5' 1") [right tibia].

Completeness: Partial skull and moderately complete infracranial skeleton. The skull is missing small portions of the left anterior parietal, basiocciput, entire face, and the left half of the mandibular body, right ascending ramus, and right central and left incisors. Infracranial remains include fragments of the clavicles, scapulae, humeral shafts, left radius and ulna missing the styloid, right radius missing the head, right femoral shaft, left femur with distal end in fragments, tibial shafts, fibulae missing the left distal end and the right proximal end, tali, right calcaneus, cuboids, right first metatarsal, left first through fifth metatarsals, sacrum, lumbar vertebrae, few thoracic vertebrae, second cervical vertebra, few ribs, ischia and pubis on the left, and few additional fragments.

Preservation: Fair - Poor. The cranial vault is reconstructed from fragments the size of fifty-cent pieces with good results although incomplete. Concretions are on some of the cranial fragments and many of the vertebrae. All the infracranial bones are weathered and broken. Most of the cancellous bone is eroded, broken or missing. The long bones do not have concretions. There are scraping cleaning marks on most of the bones. The bone color is mottled tan and black, texture is coarse, and most bones have a porcelain ring.

Additional human remains: Unknown side femoral and fibula midshaft fragment; a complete second cervical vertebra with major concretions, a distal left humerus shaft fragment and a couple of ?left rib fragments, and a right parietal missing the squamosal sutures. Originally Burial 76 (See Burial 8A): six rib fragments, five thoracic vertebral fragments and four hand bone fragments (?male because of thoracic vertebral size).

Dental Pathology: Dental wear has flattened the cusps of all molars. Dentin exposure in the premolars, first incisor and first two molars. Slight to moderate calculus. Rolled rim in the second and third molar sockets. Dark brown stain on the occlusal surface of the right mandibular molars.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 6 mm, without porosis.

Skeletal Pathology: There is a well healed fracture of the right distal radius with 20° of anterior-posterior angulation, apex anterior; and 25° of medial-lateral angulation, apex lateral. A faint raised line delimits the fracture site. Radiograph in two views documents complete remedullarization of the distal radius and complete remodeling of the cortex. Probable well healed Colles fracture of the distal radius. The right ulna is not preserved. There is moderate osteoarthritis of the hips bilaterally and slight osteoarthritis of the foot and arm bones. Osteophytic lipping of the superior anterior acetabular rim bilaterally with some isolated areas of porotic bone on the articular surface. There is no eburnation.

Noteworthy Features: Dorsal extensions of the distal articular surface of the right first metatarsal.

Comments: Could not read box label: looked like 5 or 3 or 8. Burial 8 is the most likely and needed a substantially complete skeleton. Age nearly the same as the skull which was labelled. Half of a mandible and legs of a cow with human skeletal remains. Aging: Pubic symphysis Gilbert $\sum 15$ 55.7±3.24; Todd X 50+; Suchey VI 60.0±12.4; Auricular surface VIII 60+; Cranial suture closure post. $\sum \geq 13$ ≥45.2±12.6, ant. $\sum \geq 3$ ≥41.1±10.0. Dental wear does not seem to match cranial suture fusion. Poorly preserved bone fragments (left hand: first metacarpal, hamate, scaphoid, proximal fifth metacarpal, lunate; few vertebrae, four rib fragments and a loose maxillary premolar) labelled "C5/D5 in mound of Burial 66" are assigned here because Mound 66 is in square D7 and Mound 8 is the only mound in C5/D5. Pietrusewsky attributed 4 numbers to Mound 8: Skeletons #54, 71, 58, and 26. Skeleton #54 is the most complete and appears to correspond to these remains. Skeletons 71 and 26 are consistent with remains described here as Burial 8A. Photographs: radii, right fibular, osteoarthritis of the acetabula, vertebral osteoarthritis. Radiographs: radii, right tibia and left ulna.

Burial Number: 1966 - 8A (Formerly Burial 76)

Archaeological Context: Middle Period 1?, square C5/D5, AD 135 cm, orientation ?E-W. Main burial apparently in shallow grave covered with extensive and richly furnished mound, but position not accurately recorded. Skeleton substantially complete. Much pottery, two spindle whorls, two rubbing stones, bifacial grindstone, worked bone fragment are among the mound goods.

Age: 35 - 40 years (cranial suture fusion and osteoarthritis).

Sex: Male (skull and infracranial bone morphology).

Stature: Cannot be determined.

Completeness: Partial skull and fragments of the infracranial skeleton. Present from the skull are the frontal and anterior parietal portion of the calvarium, a posterior parietal and superior occipital section, as well as the temporals, and fragments of the sphenoid bilaterally. The mandible is missing the superior ascending rami and all teeth. Fragments of the infracranial skeleton include the proximal left second metacarpal and three proximal phalanges, the second and third thoracic vertebral arches, the spinous processes of three other thoracic vertebrae, six right rib head fragments, including the bodies of the first and second ribs.

Preservation: Fair - Poor. Incomplete and fragmentary. The calvarium could not be restored because of extreme weathering of the edges of the fragments. The temporals were glued to the posterior section. No reconstruction of the infracranial fragments was possible. All breakage is old. There is a grey mud adherent to all bones in a thin layer which does not wash off. Cranial bone color is tan, texture is coarse and bone is slightly soft with no porcelain ring. Infracranial bone color is mostly black with a mottled tan-grey of the hand bones. The infracranial bones have a porcelain ring.

Additional human remains: An infant metacarpal.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 8 to 11 mm, without evidence of cribra orbitalia.

Skeletal Pathology: Slight to moderate osteoarthritis of the vertebral facets, with "rolling" of the inferior facet of the second vertebra and the superior facet of the third thoracic vertebra, suggestive of disc space loss.

Noteworthy Features: None.

Comments: Originally thought to be a separate burial (Burial 76) but found to be part of the complex of Mound 8. The cranial vault fragments were in an unnumbered box and are assigned to Mound 8 based upon Pietrusewsky's description (Pietrusewsky Skeleton #26). The infracranial remains are described as Pietrusewsky Skeleton #71. A piece of solid black pottery sorted from the human skeletal remains. Aging: Pubic symphysis Cranial suture closure post. $\Sigma \geq 7$ $\geq 39.4 \pm 9.1$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. Photographs: thoracic vertebral arches. Radiograph: cranial vault.

Burial Number: 1966 - 9

Archaeological Context: Middle Period 4?, square C4, west quadrant, AD 120 cm, orientation W-SW. Apparently supine, leg bones only present, remainder removed by digging of Burial 10.

Age: Adult (epiphyseal fusion).

Sex: Female (infracranial bone morphology and measurements).

Stature: 161.8 ± 3.5 cm (5' 3¾") [right fibula].

Completeness: Partial legs. Present are the left tibia is missing the proximal epiphysis, right tibia missing the distal end, complete right fibula, fragmentary left fibula, left proximal femoral shaft below the head and above the midshaft, and a fragment of condyles; tali, calcanea, metatarsal fragments bilaterally, five proximal foot phalanges, proximal left radius and ulna, right patella, left glenoid.

Preservation: Fair. The tibiae and fibulae are reconstructed from several fragments. The right fibula is the only complete bone. The calcanea are extremely weathered and the metatarsals are weathered and broken. Coarse, hard concretions on the foot and femoral fragments. Bone color is mottle pink-beige and brown. No porcelain ring in these remains and the bone feels slightly soft and smooth.

Additional human remains: A first metacarpal proximal phalanx, ?femoral shaft.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: No osteoarthritis of the tibiae, fibulae, foot bones.

Noteworthy Features: No cut marks noted. Squatting facets of the distal tibiae and tali. Enlarged medial tubercles of the calcanei which are slightly lipped.

Comments: Consistent with Pietrusewsky Skeleton #83. Added from Burial 10: a proximal left radius and ulna, right patella and a left glenoid fragment. Radiograph: fibulae.

Burial Number: 1966 - 10

Archaeological Context: Middle Period 5?, square C4/C5, AD 140 cm, orientation W-NW. Supine, intact from the hips to the feet but upper body badly disturbed. Axe mould fragment and one vessel in disturbed central portion of burial, subadult *bibos* and *sus* legs in deposit to east of feet.

Age: Adult (epiphyseal fusion and osteoarthritis).

Sex: Male (infracranial morphology).

Stature: 168.9 ± 4.1 cm (5' 6½") [left bicondylar femur].

Completeness: Partial cranium and infracranial skeleton. Present from the cranium are the frontal missing the left supraorbital region, portions of the left parietal at the eminence and at the pterion, left temporal and the occipital between the asterion. The infracranial remains include the humeri missing the distal ends, right scapula fragments, right distal radius and ulnar shaft fragments, femora, right missing the head; tibiae, fibulae, left talus, left cuboid, calcanea fragments bilaterally, two proximal metatarsals and a proximal first metatarsal phalanx, right fourth and fifth metatarsal, left first metatarsal and phalanges, and a few rib head fragments.

Preservation: Good - Fair. The frontal could be reconstructed but the other fragments could not. The femora and tibiae are intact, reconstructed from large fragments. The hands, feet and ribs are poorly preserved. There are coarse rock-like concretions on some of the bones. There are cleaning marks on the long axis of the long bones. Insufficient fragments to account for missing material. The bones are very heavy suggesting they may be full of soil. Bone color is uniformly mottled light tan and brown. There is a porcelain ring and the bones are heavily mineralized.

Additional human remains: Small adult (?female) patella, proximal left ulna and radius and scapula fragment, all assigned to Burial 9. Subadult femur fragments, distal breadth 44 mm; adult left distal femoral shaft fragment with fresh breakage.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 3 to 7 mm. No evidence of porosis or cribra orbitalia.

Skeletal Pathology: Slight osteoarthritis of the left ankle. There are several exostoses of the fibulae, interosseous border: at the proximal and middle thirds of the left fibula, along the anterior border, there is a sharp, triangular-shaped extension. On the right fibula, a similarly shaped exostosis occurs on the anterior border, at the proximal end of the distal one-third of the bone shaft. Both exostoses are smoothly graded into the cortex. Radiograph of the fibulae demonstrate these exostoses which are consistent with the cortex and without evidence of internal pathology.

Noteworthy Features: The femora are moderately anteriorly bowed, with extension of the *linea aspera* posteriorly. The cranium has a well marked inion.

Comments: Consistent with Pietrusewsky Skeleton #87. Two animal bone fragments sorted from the human remains. Photographs: fibular exostoses. Radiographs: tibiae, fibulae, left femur.

Burial Number: 1966 - 11: Number not used.

Burial Number: 1966 - 12

Archaeological Context: Middle Period 5, square C6 and C6/C5 and C5/D5, AD 130 cm, orientation W-NW. Supine burial with hands under pelvis, intact and in good condition. Three pots and *bibos* leg in fill over head.

Age: 35 - 40 years (auricular surface morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 165.1 ± 4.0 cm (5' 5") [left femur].

Completeness: Partial skull and fairly complete skeleton. The skull is missing the majority of the frontal, left zygoma and maxilla, left temporal, and basiocciput. The infracranial remains are missing the sternum, manubrium, proximal left radius, left ulnar midshaft, most right hand bones, most right foot bones, right patella, left metatarsals and phalanges and small tarsals, lumbar vertebral bodies, and most of the sacral bodies and arches.

Preservation: Good. The long limb bones and cranial vault are reconstructed from large fragments. The vertebrae are fragmentary with partial reconstruction. Hand and foot bones are well preserved, the innominates required reconstruction. The interior of the bones is clear. Bone color is tan with grey dirt adherent to most surfaces. Texture is coarse. Slight porcelain ring to the bone.

Additional human remains: Right scapula including glenoid and coronoid process, seventh cervical, first and second thoracic vertebra of another individual, nearly complete male mandible (See Burial 12A).

Dental Pathology: There is premortem loss of the mandibular left fourth premolar, and first and second molars. The first molars were lost some time before death with complete resorption of the sockets, while the second molars still have large sockets present with trabecular bone filling the tips of the sockets. Extreme wear with pulp exposure of the premolars in the right maxilla and mandible: the crowns are flattened with a very slight buccal slant (i.e. down toward the buccal surface) with apical abscessing. Dental wear in other teeth exposes the dentin.

Cranial Pathology: There is thickening of the frontal as it approaches the bregma. Measurements range from 6 - 10 mm. The vault has very fine pitting of the superior parietals and the superior occipital bone, which does not penetrate to the diplōe. Cribra orbitalia. The outer surface of the right zygoma is coarsely marked and slightly raised.

Skeletal Pathology: Slight osteoarthritis of the vertebral facets and slight osteophytosis of the lower thoracic and lumbar bodies. Slight osteoarthritis in the lower limbs. There is fusion of the second and third thoracic vertebrae at the spinous processes and lamina. The vertebral bodies are not fused and the disc space is preserved. The fusion is smooth and solid, without reactive bone formation. On the posterior view a slight asymmetry of the superior facets of the second thoracic vertebra is noted, the left inferior of the right. When the first thoracic vertebra is articulated there is a definite curve, apex right, of approximately 20°. The cervical vertebrae are not well preserved. Radiograph of these vertebra demonstrates complete fusion of the posterior elements, with preservation of the disc space and bodies anteriorly. Possible healed fracture of the posterior elements, or congenital fusion.

Smooth-walled erosive lesions, occurring at the margin of the articular surface and undercutting it, are noted in the bilateral capitates. There is no active reactive bone formation and the metacarpals are normal in appearance. Radiograph of the capitates documents the presence of a sclerotic, centrally demineralized lesion with scalloped borders. A small, circular, cyst-like excavation is noted in the posterior right innominate posterior to the auricular surface. There is no active reactive bone formation. There is an exostosis of the right posterior distal tibial medial malleolus at the site of the peroneal ligament groove.

Noteworthy Features: The posterior tibiae have well developed soleal lines which are raised 2-3 mm off the cortical surface. There is a dorsal extension of the articular surface of the head of the right first metatarsal.

Comments: Consistent with Pietrusewsky Skeleton #69 but no remark on intrusive material. A single piece of pottery, animal skull fragments, and a reddish pebble were sorted from the human remains. Aging: Auricular surface IV 35-40; Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Radiographs: left humerus, right ulna, left radius, tibiae, left fibulae, femora, second and third thoracic vertebrae, capitates.

Burial Number: 1966 - 12A

Archaeological Context: Intrusive in Burial 12. Measurements compared to Pietrusewsky (1974) but no match found.

Age: Young adult (dental wear).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Nearly complete mandible. The right condyle, tip of the coronoid process, and left coronoid process are missing.

Preservation: Good. The mandible was reconstructed on the left side. Two anterior incisors were broken post-depositionally and the crowns are lost. Bone color is light tan with moderate concretions and many cleaning marks.

Additional human remains:

Dental Pathology: The left mandibular third molar is erupting and the right is impacted. Slight calculus on the posterior teeth and moderate calculus in the anterior teeth. Dental attrition exposes the dentin in most teeth. Slight rolled rim of the molar tooth sockets. Coarse pitting hypoplasia of the mandibular canines, beginning at age 5-5.5 years; and small black horizontal lines across the crowns of the incisors (age 2.5-3.0 years), canines (age 5.0-5.5 years), and premolars (age 5.5-6.5 years) with whiter enamel below the line.

Cranial Pathology: None noted.

Skeletal Pathology:

Noteworthy Features: Anterior rocker morphology.

Comments: A single piece of pottery, animal skull fragments, and a reddish pebble were sorted from the human remains.

Burial Number: Mound 13: No skeletal remains recovered.

Burial Number: 1966 - 14

Archaeological Context: Middle Period 3, square C6, east quadrant, AD 125 cm, orientation north-NW. Legs, right arm, a part of the pelvis, and skull are present. Lower body disturbed by Burial 12. Vessels above and beyond head.

Age: 6 - 18 months (tibial diaphyseal length).

Sex: ?Female (ilium morphology).

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton. The right radial shaft fragments, femoral diaphyses missing the proximal ends, tibial diaphyses, and fragments of the fibular diaphyses are present.

Preservation: Fair. Incomplete, but for age to have any complete bones is quite good. The bone color is blackened grey/black mottled by mostly black. There is no porcelain ring and the bone seems soft to the touch.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted in these limited remains.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #46. A small quarter-sized piece of pottery was found with the human remains. Radiograph: tibiae.

Burial Number: 1966 - 15

Archaeological Context: Middle Period 4??, square C6 and C6/C7, AD 120 cm, orientation W. Only a few fragments of leg bones present.

Age: Adult (infracranial bone size and epiphyseal fusion).

Sex: ?Female (infracranial bone morphology).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial remains. Present are the midshaft femur fragments, small tibial shaft fragments, fibular midshafts, femoral condyle fragments, right patella, tali, calcaneal fragments, left distal tibia, navicular and two proximal metatarsals, left distal ulna, left capitate, second metacarpals, distal metacarpal shaft, five phalanges, and right trapezoid.

Preservation: Poor. All bones are fragmented and weathered. Some reconstruction of the long limb bone shafts accomplished but not much. Significant weathering of the foot bones. Numerous fragments of unidentified cancellous bone. The proximal left femur appears cut just below the lessor trochanter, very straight break. Bone color is tan with little mottling texture is smooth and there is a porcelain ring of some bones.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: No osteoarthritis noted in these remains.

Noteworthy Features: Squatting facets in the tali.

Comments: These remains were found intrusive in the box for Burials 57 and 58 and are assigned here based on description. Small box inside the wooden box contains a part of a plastic bag "NP7 C5 layer 18 human jaw fragment see NB VI, 12 12-2-66)]" The teeth are animal teeth not human. Not analyzed by Pietrusewsky.

Burial Number: 1966 - 16

Archaeological Context: Middle Period 4??; center of square E6, AD 110 cm, orientation W-SW. Body supine, hands apparently alongside or under pelvis, skull facing right. Most of body present but fragmentary. A single pot found above the head.

Age: 30 - 35 years (cranial suture fusion, dental wear, osteoarthritis).

Sex: Male (cranial morphology and femoral head diameter).

Stature: 161.3 ± 7.7 cm (5' 3½") [segment left femur].

Completeness: Partial skull and fragmentary infracranial skeleton. The skull consists of the right mandibular ramus, left body and mid-body, fragments of the temporals, occipital and parietals, and a single tooth crown. The infracranial remains identified include right humerus fragments, a left scaphoid fragment, right capitate, the midshafts of the femora, tibiae, and fibulae; right femoral head, femoral condyle, tibial plateau fragments, left talus, calcaneus fragment, bilateral first cuneiform, bilateral navicular, left second cuneiform, some *os coxae* fragments, first and second cervical vertebrae, and a large number of small fragments.

Preservation: Poor. The cranial vault seems better preserved than the infracranial remains. The teeth are broken off at the roots. Some reconstruction of the long limb bones was possible. The bone is extremely soft and weathered. Bone color is tan with a dark mud adherent. The texture is soft and coarse, no porcelain ring, breakage is both old and new, extreme weathering .

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 7 - 9 mm. No porosis or cribra orbitalia noted.

Skeletal Pathology: Slight osteoarthritis of the ankle and elbow joints.

Noteworthy Features: Well marked soleal line on tibia and well marked femora. Tripartite *os inca* bone.

Comments: Consistent with Pietrusewsky Skeleton #29. Aging: Cranial suture closure post. $\Sigma\geq0$ $\geq30.5\pm9.6$, ant. $\Sigma\geq1$ $\geq32.0\pm8.3$. Photographs: tripartite *os inca*.

Burial Number: 1966 - 17

Archaeological Context: Middle Period 4?, square E6, west quadrant, AD 105 cm, orientation W-SW. Body apparently supine, but only fragments of cranium, femora and feet present. Disturbed by interment of Burial 45. One vessel over lower legs.

Age: Middle aged (dental wear).

Sex: ?Female (infracranial measurements).

Stature: Cannot be determined.

Completeness: Fragmentary cranium and leg bones. Two mid-frontal fragments, two fragments of the left parietal, one at the sagittal and one at the squamosal sutures; left temporal at the mastoid, right auditory meatus, and the loose left maxillary third molar and the right ?mandibular third molar. The shaft of the right femur, right tibial midshaft, tali, calcaneal fragments, bilateral navicular, and right cuboid are all that is present.

Preservation: Poor. There are cleaning marks on the femoral shaft fragments. No reconstruction attempted or possible. Breakage is both recent and old. The bone is soft and extremely weathered, bone color is light tan.

Additional human remains: None.

Dental Pathology: The two loose teeth have dental wear which has flattened the cusps but not exposed the dentin. The two teeth have a light reddish brown stain on the occlusal and buccal surfaces.

Cranial Pathology: Cranial vault thickness measurements range from 7 - 8 mm, without porosis.

Skeletal Pathology: No osteoarthritis noted in these remains, but only articular surfaces of the foot bones are present.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #32. Cranial fragments were labelled "Burial 18".

Burial Number: 1966 - 18

Archaeological Context: Middle Period 4??, square E6, east quadrant, AD 105 cm, orientation W-SW. Body apparently supine but only fragments of cranium, pelvis, and legs present and bone in poor condition. Pots in the chest area.

Age: 35 - 40 years (cranial suture fusion).

Sex: Female (cranial vault morphology and femoral head diameter).

Stature: Cannot be determined.

Completeness: Moderately complete skull and fragmentary infracranial skeleton. The skull is represented by the left posterior mandible, fragments of the right mandible, the temporals, the vault missing the inferior edges of all bones, right zygoma, and a few maxillary teeth. The infracranial remains include *os coxae* fragments excavated *en bloc*, femoral heads, femoral shafts, left tibial midshaft, a small fibular fragment, and a proximal right ulnar end.

Preservation: Poor. The bone is incomplete and fragmentary. Some reconstruction of the cranial vault was done previously with restoration of the superior frontal and parietals, but the temporals could not be attached. Concretions are hardened on most of the vault bones and there are some unidentified fragments covered in concretions. Unable to completely restore any element. Bone color is tan. Texture is coarse. Breakage is both old and new.

Additional human remains: None.

Dental Pathology: Premortem loss of the mandibular left first and second molars, and the right premolars and first molar, all with complete healing of the alveoli. There is slight linear hypoplasia in the mandibular canines suggesting physiological stress at age 4.5-5.0 years. Dental attrition exposes the dentin in most teeth and the pulp in the right first molar.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 7 mm.

Skeletal Pathology: Ossific nodules of the *fovea capitis* bilaterally. No osteoarthritis of the proximal ulna or femoral heads noted.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #76. Aging: Cranial suture closure post. $\sum \geq 10$ $\geq 39.4 \pm 9.1$, ant. $\sum \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: dental hypoplasia.

Burial Number: 1966 - 19

Archaeological Context: Middle Period 4??, square E5, north quadrant, AD 120 cm, orientation W-SW. Body supine, hands alongside pelvis, skull missing. A pottery vessel was placed over the left tibia, with two additional pots placed beyond where the head should have been. An additional pot was placed by the right elbow.

Age:

Sex:

Stature:

Completeness:

Preservation:

Additional human remains:

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments: Not found in 1993 (Pietrusewsky Skeleton #60).

Burial Number: 1966 - Mound 20

Archaeological Context: Middle Period 2, square E4/E5, AD 95-115 cm, orientation NW/SE. Portion of a richly furnished mound overlying a grave. The grave was detected but only a small amount extended into the excavation area and was not excavated. A variety of pottery vessels, half of a sandstone axe mould, a polished stone bracelet fragment and skull and long bone fragments from two adults were recovered from the mound.

Age: 40 - 45 years (cranial suture fusion).

Sex: ?Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Incomplete cranium. Present are two fragments of the frontal, at the right coronal and lateral supraorbital area, and the left supraorbital fragment; parietals missing the inferior portions, temporals missing the anterior portions; the superior occipital, asterion to asterion, and condyle fragments; nasal bones, portion of the right superior zygoma, and a fragment of the right maxilla with the premolars *in situ*.

Preservation: Fair. The vault is reconstructed with the parietals, occipital and temporal fragments and the right frontal intact. Breakage is both new and old. The bone is soft and exfoliating, weathering of the basiocciput and frontal especially. Bone color is uniformly tan.

Additional human remains: None

Dental Pathology: Slight to moderate calculus is noted in the maxillary premolars and single loose molar. Dental wear exposes the dentin in the premolars and the enamel in the molar.

Cranial Pathology: Cranial vault thickness measurements range from 5 to 9 mm. There is a healed coarse porosis over the posterior parietals and superior occipital bones. There is a small round osteoma on the interior left maxillary sinus which has been exposed by breakage.

Skeletal Pathology:

Noteworthy Features:

Comments: Remains from Mound 20 are Pietrusewsky Skeleton #72 and #88, the second skull fragments were not found. Aging: Cranial suture closure post. $\sum \geq 8$ $\geq 39.4 \pm 9.1$, ant. $\sum \geq 3$ $\geq 41.1 \pm 10.0$. Photographs: maxilla, cranial porosis. Radiograph: cranial vault and maxillary fragment. This skull was labelled "E4/F4 skull XX".

Burial Number: 1966 - Mound 21: No skeletal remains found but disturbed by Burial 77.

Burial Number: 1966 - 22

Archaeological Context: Middle Period 4, square D4, AD 115 cms, orientation S-SW. Body supine, hands under pelvis, skull resting on nest of pots, feet missing. Sandstone axe mould fragment and two pieces of fired clay are associated.

Age: 40 - 45 years (auricular surface morphology, sternal rib end, cranial suture fusion).

Sex: Male (*os coxae* and skull morphology).

Stature: 168.3 ± . cm (5' 6¼") [left radius].

Completeness: Nearly complete skull and infracranial skeleton. The skull is missing the right zygoma and portions of the maxilla, right maxillary anterior teeth, nasal bones, right frontal, sphenoid body, basiocciput, and left mandibular ramus and condyle. The infracranial remains are missing the right hand, right femoral condyles, ends of the tibiae and fibulae, and most of the left foot.

Preservation: Good. The skull was reconstructed and face attached but the face has come off and cannot be restored. The mandible is well preserved. Remaining concretions on the phalanges are of a rock-hard grey mud with flecks of red. Ribs were partially reconstructed. Insufficient fragments for reconstruction. The bone is mottled tan-black and is coarse to the touch, there is no porcelain ring.

Additional human remains: Subadult cranial fragments, complete right humeral diaphysis (Burial 22A); left tibial diaphysis, rib fragment from another subadult; distal left ulna, left zygoma and an occipital fragment from a second adult.

Dental Pathology: Premortem loss of the mandibular first molars and maxillary second molars. The alveoli at the mandibular first molars are healing, while in the maxilla the alveoli are completely healed. Calculus and resorption are moderate. Dental wear exposes the pulp in the lower anterior teeth and dentin in the upper teeth. Dental wear is very uneven with sloping surfaces in the inferior anterior teeth from lingual high to labial low. There is a crescent shaped blue-green linear stain on the maxillary left central incisor just above the cemento-enamel junction.

Cranial Pathology: A well healed depressed lesion of the left posterior parietal above the asterionic suture is circular with smooth gradation into the bottom. Depth is approximately 2 mm with the deepest area along the long axis. There is a slight porosity in the floor of the defect but no reactive bone. The endocranial vault has a rounded mound of cortical bone (10 mm x 7 mm). Radiograph of the parietal demonstrates no evidence of this defect. Probable well healed skull fracture. Very fine healed porosis of the vault. Cranial thickness measurements range from 6 - 10 mm.

Skeletal Pathology: Moderate osteoarthritis of the lumbar bodies. A single well healed fracture of the angle of a left ?middle rib. There is slight flattening of the posterior body with little angulation or displacement of either fragment. Radiograph of this rib fragment demonstrates complete remedullarization. Slight appendicular osteoarthritis of the left hip.

Noteworthy Features: Radiograph of the mandible shows no evidence of the third molars, but dental wear and premortem loss may be the cause. Possible tripartite *os inca* bone, but advanced fusion of the lambdoidal sutures complicates observations.

Comments: One of the most complete skeletons, but should not have feet according to excavation notes. Corresponds to Pietrusewsky Skeleton #3. The intrusive adult material (the number "23" was written in pencil on the tape) was checked against Burials 2, 8, 10, 17, 18, 23, 36, 41, 44, 49, 84, and 88 with no match. Aging: Auricular surface VI 45-49; Sternal rib end V 38.8±7.0; Cranial suture closure post. Σ=11 =39.4±9.1, ant. Σ=5 =41.1±10.0. Photographs: tooth wear, cranial defect, wormian bones, temporals. Radiographs: skull, mandible (?third molars), rib, radii, left ulna.

Burial Number: 1966 - 22A

Archaeological Context: Sorted from Burial 22.

Age: 1 - 2 years (diaphyseal length and epiphyseal fusion).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary cranium and infracranial skeleton. Present from the cranium are the occipital (missing the *pars lateralis* and *pars basilaris*) and fragments of the parietals, as well as the right humeral diaphysis.

Preservation: Good. The vault bones are tan with mottled blackening. The occipital and humeral diaphyses are complete.

Additional human remains: Incomplete left tibial diaphysis and rib fragment from a second subadult; left distal ulna and occipital from an adult; Burial 22.

Dental Pathology:

Cranial Pathology: None noted.

Skeletal Pathology: None noted.

Noteworthy Features: The posterior occipital synchondrosis is open.

Comments: This material was checked against Burials 14, and 79 with no match. Possible that this is part of Burial 35, but provenience not associated.

Burial Number: 1966 - 23

Archaeological Context: Middle Period 5??, square D4 and C4/D4, AD 110 cm, orientation NW. Body supine, hands under pelvis, skull separated from body and rolled on side probably as a result of a disturbance at the right shoulder. Vessels placed on or just inside top of grave at head end. *Bibos* leg in disturbed region beyond feet.

Age: 25 - 30 years (auricular surface morphology, cranial suture fusion).

Sex: Female (cranial and *os coxae* morphology).

Stature: 155.5 ± 2.1 cm (5' 1¼") [left bicondylar femur and tibia].

Completeness: Nearly complete cranium and fairly complete infracranial skeleton. The cranium is missing the right superior temporal, right sphenoid, and the left pterion region. The infracranial remains are missing the right clavicle, scapula, humerus, distal ends of the radii and ulnae, most carpals, some metacarpals on the right side, patellae, pubic rami, sternum, manubrium, left talus, distal phalanges of the left foot, some of the right fibula, cervical vertebrae, two thoracic vertebrae,and most sternal rib ends,.

Preservation: Good. The cranium is reconstructed with little distortion. The dentition is well preserved. The infracranial remains required little reconstruction. Weathering of all cancellous bone. The vertebrae are well preserved. There are insufficient fragments to complete reconstruction. Bone color is tan and mottled smooth in texture with a porcelain ring.

Additional human remains: None.

Dental Pathology: Peg-shaped maxillary third molars and lateral incisors bilaterally. Slight distal rotation of the third premolar bilaterally. No tooth loss, caries abscessing or hypoplasia. Dental wear is must exposing the dentin in the first molars. Dentin exposure in the incisors and canines.

Cranial Pathology: Cranial vault thickness measurements ranges from 3 - 9 mm. No evidence of cranial vault porosis, thickening is subjective but does not appear to be.

Skeletal Pathology: Slight osteoarthritis of a few vertebral facets, bodies of the third and fourth lumbar vertebra and the occipital condyles. Bilateral preauricular sulci suggest childbirth. Slight enlargement of the bilateral calcaneal medial tubercles.

Noteworthy Features: Sacralization of the fifth lumbar vertebra.

Comments: Pietrusewsky (1974) states that skull was labelled "F" and found as such, with an additional label "Burial 23". Consistent with Pietrusewsky Skeleton #85 with substantiation of notation about peg-shaped teeth. Aging: Auricular surface II 25-30; Cranial suture closure post. Σ=2 =30.5±9.6, ant. Σ=0 =32.0±8.3. Photographs: cranium, dentition, sacrum, preauricular sulcus. Radiographs: cranium, tibiae, left fibula and left femur.

Burial Number: 1966 - 24

Archaeological Context: Middle Period 3?, square D4, east quadrant and square D4/E4, AD 150 cm, orientation N-NW. Upper half of burial in excavation area, supine but disarticulated. Skull shifted to the left and resting on two pots. The ribs, vertebrae, and right humerus are jumbled. A clam shell and sherd sheet were found where the skull should have been. Two vessels placed on or near the top of the grave fill near the head end of the grave.

Age: 40 - 45 years (auricular surface morphology and cranial suture fusion).

Sex: Female (cranial and infracranial morphology).

Stature: 154.9 ± . cm (5' 1") [left humerus].

Completeness: Moderately complete skull and partial infracranial skeleton. The skull is missing fragments of the sphenoid, basiocciput, superior temporals and pterygoid., and a few teeth. The infracranial remains include the humeri, the right missing the distal end; the radii missing the distal ends; the ulnae, the left missing the distal end, the right clavicle and fragments of the left; scapulae fragments, cervical and thoracic vertebrae, and fragments of the *os coxae*.

Preservation: Good - Fair. The cranial vault is partially reconstructed, unable to restore the face or the temporals to the vault. The vault has considerable distortion to the parietals, likely due to the concretions affecting the reconstruction. The mandible is well preserved. Reconstruction of the long limb bones from large pieces. The left humerus is complete. Concretions of grey mud cover the entire skull inside and out, making reconstruction and measurements difficult. Weathering of the clavicles. Bone color is mottled black and tan. There is a porcelain ring to the mandible and other bones.

Additional human remains: Fragment of an adult frontal, radial head; right femoral diaphyses of two different aged subadults (97 mm in length for one and proximal AP 11 mm for the other).

Dental Pathology: Dental wear exposes the dentin in all teeth of both jaws. Rolled rim is slight in the mandibular alveoli and absent in the maxilla. Slight alveolar resorption in the maxillary posterior sockets.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 9 mm. Healed cribra orbitalia, no apparent porosis.

Skeletal Pathology: Slight osteoarthritis of the humeral heads and left proximal forearm bones and slight lipping of the vertebral facets but not the bodies..

Noteworthy Features: Fused sternum and manubrium, peg-shaped left maxillary third molar.

Comments: Portions of Burial 26 were found in this box. Consistent with Pietrusewsky Skeleton #33. Aging: Auricular surface V 40-45; Sternal rib end IV-V 28.2±3.83/38.8±7.0; Cranial suture closure post. $\Sigma\geq3$ $\geq34.7\pm7.8$, ant. $\Sigma\geq1$ $\geq32.0\pm8.3$. Photographs: tooth wear, alveolar resorption, mandibular tooth winging. Radiographs: cranium, left humerus, right ulna.

Burial Number: 1966 - Mound 25A

Archaeological Context: Middle Period 1?, square D6, center and east quadrant, AD 125 cm, circular orientation. An incompletely cleared, diffuse assemblage of pots. Adult *bibos* leg and skull recovered. Material originally classified as Burial 89 in the field has been grouped with this mound.

Age: Adult (infracranial bone size).

Sex: ?Male (infracranial bone morphology).

Stature: 166.4 ± 7.8 cm (5' 5½") [segment right femur].

Completeness: Fragmentary leg long limb bones. Fragments of the right femur including the head, greater and lessor trochanter and midshaft; and fragments of the left tibia including the midshaft; and the distal end missing the medial malleolus.

Preservation: Poor. Incomplete, with no articulations. The right proximal femur is well preserved but the remaining bones are reconstructed from small fragments after recent damage during storage. The bone color is light tan, texture is soft, no porcelain ring.

Additional human remains: Burial 25B, subadult proximal tibial diaphysis fragment (breadth 25 mm).

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the distal tibia.

Noteworthy Features: Large, well marked distal tibial squatting facet.

Comments: Corresponds to Pietrusewsky Skeleton #40. Excavation notes imply no skeletal remains were recovered but Pietrusewsky identified two individuals and these were found in the box numbered 25.

Burial Number: 1966 - Mound 25B

Archaeological Context: Middle Period 1?, squares D6, east quadrant, AD 125 cm, circular orientation. An incompletely cleared diffuse assemblage of pots, which were not excavated due to time pressure. Adult *bibos* leg and skull were recovered. Material assigned to Burial 89 in the field has been grouped with this mound.

Age: Adult (infracranial bone size).

Sex: ?Female (infracranial bone morphology).

Stature: Cannot be determined.

Completeness: Fragments of the mandible and infracranial skeleton. Cranial vault fragments are present but unidentified, the right mandibular body from the third premolar to the ascending ramus, a left tibial midshaft fragment, fibular and femoral shaft fragments are present.

Preservation: Poor. Incomplete, no articulations. Cranial fragments are *en bloc*, very fragile, mostly unidentified. The bone color is light tan, texture is soft, no porcelain ring.

Additional human remains: Burial 25A, and a subadult proximal tibial diaphysis fragment (breadth 25 mm).

Dental Pathology: Marked linear dental enamel hypoplasia of the right mandibular first molar at age 2 years. Wear has flattened the cusps and just exposed the dentin.

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments: Corresponds to Pietrusewsky Skeleton #41. Excavation notes imply no skeletal remains were recovered but Pietrusewsky identified two individuals and these were found in the box numbered 25. Photographs: dental hypoplasia.

Burial Number: 1966 - 26

Archaeological Context: Early Period 3, square D4; east quadrant, AD 215 cm, orientation S-SW. Burial supine but disarticulated with ribs and vertebrae jumbled. All, but the lower legs which are in the D4 south baulk, was excavated. Two unique class 2 vessels placed in the fill, two other vessels along lower legs, and a third vessel beyond head. Clay pellet and bronze fragment and a sharpening stone also recovered.

Age: 30 - 35 years (auricular surface morphology, cranial suture fusion).

Sex: Male (infracranial bone size, *os coxae* morphology).

Stature: 165.4 ± 4.1 cm (5' 5") [left bicondylar femur].

Completeness: Moderately complete skull and infracranial skeleton. The skull includes include the vault, halves of the maxilla, left zygoma fragment, basiocciput fragments, and halves of the mandible. Present from the infracranial skeleton are scapular fragments, humeri, clavicles, few hand bones, fragments of the radii and ulnae, proximal tibiae and left fibulae, femora, rib fragments, thoracic and lumbar vertebrae, and *os coxae* fragments.

Preservation: Fair. Very heavy concretions on all bones. Vault reconstructed but supraorbital region is missing. The mandible could not be restored. Ribs are fragmented. Some reconstruction of the vertebrae and humeri but concretions restrict reconstruction. No reconstruction of ribs possible. Fresh breakage of the distal tibiae, femora and humeri reconstructed to full length. Bone color is pinkish beige.

Additional human remains: None.

Dental Pathology: Slight rolled rim in the mandibular posterior tooth sockets. Slight alveolar resorption in the premolar region. No caries or abscessing, no premortem tooth loss. There is wear to the dentin in the incisors and the first molars, all other teeth have enamel wear but the cusps are flattened. The occlusal surface of the right mandibular third molar is stained black.

Cranial Pathology: Cranial vault thickness measurements range from 7 - 10 mm. Healed porosis over the frontal and superior parietals, giving the vault a slightly uneven texture.

Skeletal Pathology: Slight osteoarthritis of the humeral heads, glenoid, tibial plateau and vertebral facets. No lipping of the bodies, no porosis.

Noteworthy Features: The right occipital condyle has a impressed "fold" of articular surface at the medial anterior surface. The left condyle is nearly double and the right appears slightly shorter in length. Robust skull but small teeth.

Comments: Consistent with Pietrusewsky Skeleton #37. Aging: Auricular surface III 30-34; Cranial suture closure post. $\Sigma \geq 1$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: auricular surface morphology, occipital condyle, distal radius, tooth wear. Radiographs: left humerus, left femur, cranium.

Burial Number: 1966 - 27

Archaeological Context: Middle Period 3?, square E4 and E4/F4, AD 175 cm, orientation SW. Body supine, only lower legs and feet in excavation area. Bones of the feet are mingled. Two associated pots appear to have been placed just within or on top of the upper grave fill, and an entire *bovine* leg was extended in the foot end of the grave. This grave disturbed Burial 28.

Age: Adult (infracranial bone size).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Partial leg bones. Present are the distal right femoral shaft, tibiae shafts, fibulae with the distal ends but no the proximal ends, right calcaneus, right and left first three metatarsals, and the left proximal phalanges.

Preservation: Fair. Incomplete remains. Significant weathering of the cancellous bone. Reconstruction of the fibulae from 3 inch pieces. Old breakage of the tibiae and new breakage of the femur but unable to reconstruct. Few measurements or observations could be made. Bone color is mottled tan and black. Porcelain ring of the metatarsals.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features: Medial and lateral talar extension. Lateral squatting facet.

Comments: Found intrusive in Burial 52 and assigned here based on description. Consistent with Pietrusewsky Skeleton #6.

Burial Number: 1966 - 28

Archaeological Context: Middle Period 2, square F4 and E4/F4, AD 115 cm, orientation NW. Body supine, hands along pelvis, skull and upper trunk disturbed by Burial 27. Burial 29 appears to have been laid on top of Burial 28 in a shallow grave, but a later disturbance by Burials 40 and 49 obscures the provenience. Also associated are a large sandstone fragment, unifacial grindstone fragment, small axe mould fragment and forelimbs of a subadult *sus*.

Age: 25 - 30 years (auricular surface morphology and dental wear).

Sex: Female (*os coxae* morphology).

Stature: 161.5 ± 3.0 cm (5' 3¾") [left femur].

Completeness: Partial skull and moderately complete infracranial skeleton. The skull is missing the lower portions of the parietals, anterior temporals, anterior maxilla, right lateral orbit, mandibular left premolars and incisors. Missing from the infracranial skeleton are the right humeral head, most of the scapulae, the ends of the clavicles, third through the seventh cervical and first through the eighth thoracic vertebrae, most of the ribs, most of the left carpals, and the phalanges of the right foot.

Preservation: Good - Fair. The frontal and parietals are reconstructed as a unit. The occipital could not be restored and neither could the temporals or face. The mandible is glued at the symphysis with clay. Cleaning marks are visible on the skull. Concretions are heavy on the maxilla and occipital bone. The hands and feet are well preserved, while the right shoulder is poorly preserved. Concretions fuse the right clavicle to the first ribs, and there is weathering of most epiphyses. Many of the long limb bones were reconstructed to complete lengths. Infracranial bone color is light tan, with hard grey concretions on many bones. Porcelain ring in the cranial and hand bones.

Additional human remains: None.

Dental Pathology: Premortem loss of the mandibular left first molar due to abscessing. Slight rolled rim on the left mandibular posterior sockets. Slight hypoplasia, in the form of horizontal depressions and non-linear pits, of the canines and incisors in both jaws, suggesting physiological stress at ages 3.5-4.0 and 4.5-5.5 years. Dental attrition exposes the dentin in the mandibular and maxillary incisors.

Cranial Pathology: Cranial vault thickness measurements range from 5 to 7 mm. There is a slight porosis around the left auditory meatus which does not perforate the outer table. The left mastoid process appears deflated and very small. Radiograph of the temporal demonstrates an intact mastoid with normal pneumatization.

Skeletal Pathology: There is an expansion or flaring of the proximal end of the left clavicle, and it appears shortened relative to the right. Neither of the clavicles are well preserved, both excavated *en bloc*. The right clavicle is fragmented near the distal end and the proximal end is missing, while the left clavicle is missing the distal end. There is no active reactive bone formation. Radiograph reveals no evidence of a fracture line, no sclerosis or angulation, but there is a change in character of the bone at the medial end, from a uniform density to a more open and less organized appearance. Possible childhood fracture of the proximal left clavicle. Slight dorsal extension of the distal facet of the first metatarsals. Enlarged medial calcaneal tubercles, but without spurring. Enlarged nutrient foramina (6 x 2 mm), which follow the long axis of the bone and are not associated with reactive bone formation, are noted in the third metatarsals. Radiograph of the third metatarsals reveal no abnormalities of the internal structure.

Noteworthy Features: Six short cutmarks on the anterior medial end of the left clavicle.

Comments: Consistent with Pietrusewsky Skeleton #49, but wear facets noted on incisors not found. Aging: Auricular surface II 25-29; Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Radiograph: left femur, right fibula, left radius and left ulna, skull, mastoid process. Photographs: dentition, hypoplasia, dental wear, mandible, mastoid, left clavicle.

Burial Number: 1966 - 29

Archaeological Context: Middle Period 2, square E4/F4, AD 110 cm, orientation NW. Body supine, skull, upper arms, and torso present. Laid in shallow mound over Burial 28 at about the same time. Clamshell under head.

Age: 2 - 3 years (diaphyseal length and dental eruption).

Sex: ?Female (iliac morphology).

Stature: Cannot be determined.

Completeness: Cranial fragments and partial infracranial skeleton. The cranium is represented by the maxilla, with teeth *in situ*, except the central incisors; the occipital bilaterally, petrous portions of the temporals, fragments of the parietals and frontals. Infracranial remains include the right humerus; right clavicle, bilateral rib fragments, right ilium and fragments of the six cervical vertebrae.

Preservation: Good - Fair. Cranial vault could not be restored. The humeral diaphysis is complete. There is weathering and breakage of the clavicle and ribs, most breakage is old. Some ribs are fused *en bloc*. The ilium is very weathered. Bone color is tan mottled black with smooth texture.

Additional human remains: None.

Dental Pathology: Slight enamel wear. The crowns of the deciduous maxillary first molars are eroded on the lingual surfaces, and there are small eroded areas on the left maxillary lateral incisor and canine. The defects may be post-depositional. Slight calculus on the molar teeth. There is a black stain on the labial surface enamel on the crowns of the maxillary deciduous lateral incisors and canine.

Cranial Pathology: Cranial vault thickness measurements are 3 mm at the parietal eminence and lambda.

Skeletal Pathology: None noted.

Noteworthy Features: Carabelli's cusps bilateral deciduous second molars.

Comments: Dental age is 3 - 4 years while diaphyseal length is 1 - 2 years, middle ground chosen. Photographs: dentition. Consistent with Pietrusewsky Skeleton #12.

Burial Number: 1966 - 30

Archaeological Context: Middle Period 1?, square F4, east quadrant, AD 130 - 140 cm. Disturbed by Burials 65, 72 and 85. Grave pit of presumed primary interment extended down at least 30 cm below the mound and was not excavated. Mound contained part of a skull, long bones and some hand and foot bones, sharpening stone; ***bibos*** and ***sus*** mandibles.

Age: 20 - 25 years (dental eruption and wear).

Sex: Female (infracranial morphology).

Stature: 153.5 ± 3.5 cm (5' ½") [right tibia].

Completeness: Skull fragments and partial infracranial skeleton. The skull is represented by a fragment of the parietal, mandible missing the left condyle and anterior teeth; and the maxilla halves with the posterior dentition *in situ*. The infracranial skeleton includes the complete right humerus, fragments of the left humerus, clavicles, forearms, hands, *os coxae*, femoral heads, right femoral shaft, right tibia fragments of the left tibia, fragments of the fibula ?side, tali, some right metatarsals, the sacrum, lumbar vertebral bodies and rib fragments.

Preservation: Fair. Although the tibia and humerus are complete, most bones are incomplete and have encrustations. These are very difficult to remove and appear on nearly all articular surfaces. The ribs could not be restored. Some of the vertebrae are *en bloc*. Bone color is mottled brown and tan, coarse in texture, and weathering the foot bones and innominates. There is a porcelain ring to the bones.

Additional human remains: Subadult left proximal ulnar diaphysis, fragment of a right clavicle, sacral fragments and an adult cranial vault [assigned Burial 30A].

Dental Pathology: The right maxillary canine is inverted and erupting out of the alveolus at the nasal extension. The lingual surface of the tooth appears to be facing anteriorly. The deciduous tooth is lost. There is no root exposure at the alveolus or palate. Radiograph of the maxillary fragment demonstrates the errant tooth crown, although no root is visualized. Dental wear has flattened the cusps of the molars without dentin exposure. Slight calculus is present on most teeth. There is moderate alveolar resorption in the mandibular left molar sockets as well as moderate to marked rolled rim. The maxillary teeth have a light brown stain on the occlusal surfaces of the molars.

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the right hand bones, otherwise no pathology noted.

Noteworthy Features: Carabelli's cusps maxillary first molar bilaterally. Radiograph of the mandible for assessment of the third molar, demonstrates no evidence of the molar on the right side, the left side preservation is too poor for evaluation.

Comments: Consistent with Pietrusewsky Skeleton #5, but a cranial vault fragment appeared older and male so was removed to Burial 30A. Radiograph: right tibia, mandible, maxilla, right humerus, left radius and left ulna. Photographs: maxilla.

Burial Number: 1966 - 30A

Archaeological Context: Sorted from Burial 30. Middle Period 1?, square F4, east quadrant, AD 130 - 140 cm. Disturbed mound feature.

Age: 40 - 45 years (cranial suture fusion).

Sex: Male (cranial morphology).

Stature: Cannot be determined.

Completeness: Partial cranial vault. The cranial vault is missing the right frontal, right anterior parietal, and the left parietal at the coronal suture. Also present are a clavicle fragment and a sacral fragment.

Preservation: Good. Reconstructed from large fragments with restoration of posterior vault. Bone color is tan with a brown mud adherent, and no concretions. Texture is hard and firm.

Additional human remains:

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 4 to 10 mm. There is a smooth-walled, oval defect of the suprameatal triangle of the right temporal. The defect measures 4 x 2 mm and is without reactive bone formation. Radiograph of the posterior vault demonstrates bilateral, large, well visualized mastoid processes. Pneumatization of the left side appears normal with discrete, uniform air cells, on the right side fewer cells are visible and there is a general density. The defect is easily seen, round, well marked borders with slight sclerosis at the posterior edge. Possible chronic mastoiditis.

Skeletal Pathology:

Noteworthy Features: Very robust individual. *Os inca* bone.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 4$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 3$ $\geq 41.1 \pm 10.0$. Photographs: *os inca* bone, right temporal. Radiograph: right temporal.

Burial Number: 1966 - 31

Archaeological Context: Middle Period 5, square E3 and E3/E4, AD 140 cm, orientation NW. Body supine, hands resting on pelvis, skull tilted back, feet inside the baulk and not excavated. Pots in group beyond head, 16 bronze bracelets on the left lower arm and one on the right wrist.

Age: 25 - 30 years (auricular surface morphology, cranial suture aging).

Sex: Female (skull and *os coxae* morphology).

Stature: 152.8 ± 3.0 cm (5' ¼") [left femur].

Completeness: Substantially complete skull and fairly complete infracranial skeleton. The skull is missing a portion of the lower right orbit, right zygoma, right mandibular body and ascending ramus. Infracranial remains are missing the right distal clavicle, left humeral ends, most of the scapulae, left ulna, right proximal radius and distal ulna, most carpals and some metacarpals, pubic symphyses, left patella, fibulae ends, distal tibiae, feet, upper thoracic and cervical vertebrae, and sternum.

Preservation: Good. The cranium is reconstructed with good results, the face is restored to the vault. Post-depositional breakage of the crowns of the mandibular anterior teeth and the right maxillary incisors. The ribs are fragmented, not reconstructible. The femora and *os coxae* are well preserved. There is weathering damage to most of the epiphyses. The left *os coxae*, left distal humeral shaft, and right distal radius are stained light green (pale like pistachio ice cream). No concretions. Bone color is mottled tan and grey, although the skull is darker, mottled black. Porcelain ring of all bones.

Additional human remains: A large male proximal humerus shaft, and a ?female tibial shaft fragment, which are likely to be from Mound 32 (see Burial 32).

Dental Pathology: Slight calculus is present on the maxillary teeth with moderate accumulation on the left mandibular premolars. Slight rolled rim in the posterior tooth sockets of both jaws. Linear enamel hypoplasia of the maxillary posterior teeth maxillary premolars and molars suggesting physiological stress at ages 2-3 years and 4.5-5.0 years. Slight to dentin exposure if the first molars. The maxillary left central incisor has a scooped occlusal wear pattern.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 8 mm.

Skeletal Pathology: Slight osteoarthritis of few vertebral facets available and the right hand bones.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #24. Aging: Auricular surface II 25-29; Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: dental wear, hypoplasia in mandible. Radiograph: cranium, right humerus, left radius, femora.

Burial Number: Mound 32

Archaeological Context: Middle Period 2??, square E3, center of square, AD 125-130 cm, orientation ?. Mound extended across narrow E3 trench; presumed primary burial not detected. A pair of sandstone mounds for casting a round-bladed bronze ax, two pots, and fragments of an adult humerus and tibia were recovered from the mound.

Age: Adult (infracranial bone size).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Two long bone fragments. A large ?male proximal humeral shaft and a ?female tibial midshaft.

Preservation: No measurements made.

Additional human remains:

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: These remains are consistent with Pietrusewsky Skeleton #45. No data collected and not used in this analysis.

Burial Number: 1966 - 33: Only the skull extended into the excavation and it was not lifted.

Burial Number: 1966 - 34

Archaeological Context: Middle Period 5, square C3 and C3/C4, AD 125 cm. Body supine, hands under pelvis, feet side by side. This interment removed a portion of Burial 4. Two pots found beyond the head. The skeleton was substantially complete but disturbed by later activity.

Age: 40 - 45 years (cranial suture fusion).

Sex: Male (skull and *os coxae* morphology).

Stature: 167.3 ± 4.0 cm (5' 5¼") [left femur].

Completeness: Nearly complete skull and infracranial skeleton. The skull is missing portions of the basiocciput, sphenoid body, zygomatic processes, and the right mandibular condyle. Infracranial remains are missing much of the scapulae, right carpals and distal hand phalanges, right patella, distal foot phalanges, portions of the vertebral bodies and arches, manubrium and sternum.

Preservation: Good. The cranial vault was reconstructed from medium-sized pieces with some distortion of the parietals. The left temporal and basiocciput could not be restored. Weathering of the cancellous bone. Some reconstruction of the long limb bones. Ribs, vertebrae, sacrum and innominates are fragmented and weathered, little reconstruction possible. Bone color is mottled tan, texture is coarse, cleaning marks present on most bones. Porcelain ring to all remains.

Additional human remains: None.

Dental Pathology: Slight crowding of the mandibular anterior dentition with the lateral incisors overlapping behind the central incisors. Dental attrition exposes the dentin in the upper and lower molars. Slight rolled rim in the lower posterior tooth sockets.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 8 mm.

Skeletal Pathology: Slight osteoarthritis of the infracranial and cranial remains. The second metacarpals have symmetrical porotic defects of the proximal articular surfaces, between the two tubercles. Trabecular bone is exposed without periostitis. The right calcaneus has a raised, osteophyte on the proximal end of the anterior talar facet which extends medially. There are no corresponding changes to the talus. The left auricular surface of the innominate is weathered and incompletely preserved, but there is a noticeable erosion of the surface with some depression at the base of which is a round, smooth walled opening which penetrates to the cancellous bone but does not perforate the posterior iliac blade. Radiograph of the ilium shows a circular defect of demineralization which is not expansive and shows no sclerosis. Differential diagnosis includes postdepositional damage or infection.

Noteworthy Features: The bicipital groove of the humeri is strongly marked bilaterally. There is a large ossific nodule of the right pubic bone at the posterior side of the superior symphysis.

Comments: Consistent with Pietrusewsky Skeleton #36, skull association substantiated by photograph (1974:). The intrusive material in Burial 4 does not go here. Aging: Pubic symphysis Gilbert $\sum 14$ 35.8±3.89, Todd VIII 39-44, Suchey V 45.6±10.4; Cranial suture closure post. $\sum \geq 9$ $\geq 39.4 \pm 9.1$, ant. $\sum \geq 3$ $\geq 41.1 \pm 10.0$. Dental wear and disease do not go with age estimate. Photographs: Dentition, second metacarpals, auricular surface, pubic symphysis. Radiographs: skull, ulna, femora, tibiae, fibulae.

Burial Number: 1966 - 35 (I C5)

Archaeological Context: Middle Period 5??, square C5, west quadrant, AD 130 cm, orientation NW. Dug into Mound 77 and badly damaged by later disturbance. Skull and upper body bone fragments recovered. Shell bracelet on left wrist.

Age: 2 - 3 years (dental eruption, epiphyseal fusion, diaphyseal measurement).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Incomplete skull and infracranial fragments. Identified fragments of the skull include the frontal, left parietal, left zygoma, fragments of the temporal and basiocciput, maxillary dentition *in situ*, and mandible. Infracranial remains include the distal left clavicle, a single long bone diaphysis (?humerus) missing the ends, left cervical arches, few thoracic vertebral arches, two lower thoracic/lumbar vertebral bodies, and 11 rib fragments.

Preservation: Poor. Fragmented and incomplete. The mandible is reconstructed from three fragments. The frontal and left parietal are reconstructed from fifty-cent piece sized fragments. There are insufficient fragments to complete reconstruction. Bone color is mottle tan-black with some hard concretions on the exterior bone surfaces. There is a porcelain ring to all fragments. No data could be collected from the infracranial remains.

Additional human remains: None.

Dental Pathology: Deciduous dentition without caries or hypoplasia. The dental wear is enamel polishing on all molars. A black stain is noted on the buccal surface and in the fissures of the occlusal surfaces of the deciduous molars and canines of both jaws.

Cranial Pathology: Cranial vault thickness measurements range from 2 to 4 mm.

Skeletal Pathology: None noted.

Noteworthy Features: Carabelli's cusps of the deciduous second molars.

Comments: Pietrusewsky (1974) states skull labelled "I C5" and found as such. Consistent with Pietrusewsky Skeleton #66. Photographs of maxillary and mandibular teeth, mandible sex determination.

Burial Number: 1966 - 36 (II C 5)

Archaeological Context: Middle Period 5??, square C5, center of square, AD 130 cm, orientation W-SW ?. Badly disturbed by Burial 46. Fragments of skull, humerus, femur present.

Age: 3 - 4 years (dental eruption, humeral diaphyseal length).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Skull fragments and incomplete infracranial skeleton. Identified portions of the skull include fragments of the mandible missing all deciduous teeth and the right ascending ramus; bilateral temporal and petrous bones; left lateral orbit; left lateral occipital condyle and *pars basilaris*, and fragments of the frontal and parietals. The infracranial remains include the right humeral diaphysis, left proximal femoral diaphysis, left clavicle missing the ends; the second cervical vertebra, cervical vertebral arches, rib fragments, right scapula at the glenoid and acromion process, and few hand phalanges.

Preservation: Fair - Poor. Fragmentary and incomplete. The mandible was reconstructed, but vault fragments were not. The humerus was reconstructed to complete length. Bone color in the skull is mottled orange-black and there is a porcelain ring to all fragments. The infracranial bone is mottled tan-black with concretions fusing the vertebral arches and some ribs.

Additional human remains: None.

Dental Pathology: Only the unerupted first permanent molars are preserved. Interesting brown stain which occurs mid-crown while the top and bottom of the crown are white. If this were a stain resulting from ground minerals, then all of the incompletely mineralized tooth should have taken up the stain equally. Since there is white enamel above and below the stain, it suggests that the stain was accumulated during development of the tooth. The mandibular first molar crown is completed by the age of three, suggesting that this stain was formed during crown development around age 1.5 years.

Cranial Pathology: None noted.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Pietrusewsky (1974) states skull labelled "II C 5" and found as such. Consistent with Pietrusewsky Skeleton #63. Radiograph: right humerus. Photographs: dental staining.

Burial Number: 1966 - 37: Most of grave unexcavated in baulk.

Burial Number: 1966 - 38

Archaeological Context: Middle Period 3, square G4, center of square, AD 110 cm, orientation SW. Body apparently supine, but badly disturbed by the interment of Burial 71 and later pits. Skull, shoulders, arm and leg bones were recovered. Pottery vessel, bovine leg and worked marine shell are associated. Mound to the southwest of the grave contained a humerus fragment each from two individuals.

Age: Adult (epiphyseal fusion).

Sex: ?Male (infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial remains. Present are the right humerus missing the proximal end, the left humeral midshaft, bilateral tibial shafts missing the ends, left fibula missing the ends, fragment of the right fibula, distal femur, distal right ulnar midshaft, and patella.

Preservation: Fair. The bone is solid. The right humerus shaft is well preserved. The patella is weathered. The left fibula is reconstructed but incomplete. There are no additional fragments. Bone color is light tan with some black and orange-tan mottling. No porcelain ring. Texture is coarse. The left tibia was filled with very red dirt (ocher?), atypical of other matrix.

Additional human remains: Femoral midshaft and left tibial midshaft fragments from two different individuals (PS #15 and #43).

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight porosis of the medial articular surface of the patella.

Noteworthy Features: Robust humeri. The shaft of the right humerus is well preserved, with the distal end and shaft up to and including the deltoid tuberosity. There are multiple (at least 8) oblique cutmarks, each up to 11 mm in length and with an approximate width of 0.5 mm, on the upper shaft fragment, posterior to the inferior deltoid tuberosity. No additional cutmarks noted on other elements.

Comments: Consistent with Pietrusewsky Skeleton #14, but complete femur is now missing, and the remains are not consistent with the excavator's comments. Photograph: cutmarks.

Burial Number: 1966 - 39: Number not used.

Burial Number: 1966 - 40

Archaeological Context: Middle Period 8, square F4, center and west quadrant, AD 110 cm, orientation SW. Body supine, right hand on pelvis holding bronze lump, left hand along side, feet on sherd sheet, face of skull lost to later disturbance. Head resting on a sherd sheet.

Age: 55 - 60 years (pubic symphysis and auricular surface morphology).

Sex: Female (cranial and infracranial morphology).

Stature: 160.2 ± 3.0 cm (5' 3") [right femur].

Completeness: Incomplete skull and moderately complete skeleton. The skull is represented by the left temporal, left inferior parietal, left occipital, frontal fragment, and mandible missing the right posterior ascending ramus. Infracranial remains are missing most ribs, third through the seventh cervical vertebrae, left clavicle, sternum, manubrium, some hand bones, fragments of the proximal tibiae, patellae, and middle and distal foot phalanges.

Preservation: Fair - Good. The cranial vault is incomplete, missing most bones. Some reconstruction of the mandible was required. The hand bones and metatarsals are well preserved but there is weathering loss of the proximal and distal femora and tibiae. Reconstruction of most long limb bones and vertebrae, but many fragments missing. Bone color is tan to brown. Porcelain ring of all bones.

Additional human remains: Left tibial and ulnar midshaft, and two loose mandibular incisors.

Dental Pathology: Premortem loss of the mandibular molars with complete healing of the alveoli. Pulp exposure in the right canine and third premolar. The right fourth premolar is rotated 90° forward.

Cranial Pathology: Healed pitting of the superior occipital. Cranial vault thickness measurements range from 3 - 7 mm.

Skeletal Pathology: The fourth through the tenth thoracic vertebrae are formed into a single solid mass with collapse of the vertebral bodies, fusion of the posterior elements, and a kyphosis of approximately 120 degrees. The inferior end-plate of the tenth and the superior end-plate of the fourth thoracic vertebrae are intact, the anterior surfaces of the two nearly touching. Fusion of the posterior elements is a solid, smooth mass with no reactive bone. The inferior end-plate of the third thoracic vertebra has an eroded surface with exposure of the trabeculae, but no evidence of remodeling or periostitis. There is a smooth cavitation (7 x 7 mm) of the superior end-plate of the second lumbar vertebra with erosion around the defect, and evidence of remodeling in the form of thickened trabeculae in the base of the defect. Radiograph of the fusion mass demonstrates fairly uniform bone density and no additional lesions are seen in the lumbar vertebrae. Possible tuberculosis. The right superior facet of the eleventh thoracic vertebra has moderate osteoarthritic changes on the right and only slight changes on the left, perhaps reflecting some rotational deformity of the spine as well.

Noteworthy Features: Tripartite *os inca* formation provisionally noted in a fragment of the occipital.

Comments: Consistent with Pietrusewsky Skeleton #62. Aging: Pubic symphysis Gilbert $\sum 15$ 55.7±3.24, Todd X 50+, Suchey VI 60.0±12.4; Auricular surface VII 50-59; Cranial suture closure post. $\sum \geq 2$ ≥30.5±9.6, ant. $\sum \geq 1$ ≥32.0±8.3. Photographs: auricular surface, symphysis pubis, right glenoid osteoarthritis, right ulna, mandibular tooth loss, wormian bones, vertebrae. Radiographs: all vertebral bodies, fusion mass, ulnae, left radius.

Burial Number: 1966 - 41

Archaeological Context: Middle Period 8?, square G4, center and east quadrant, AD 85 cm, orientation SW. Body apparently supine but disturbed by later pits. Only legs, feet and some skull fragments remain.

Age: Middle-aged (dental wear).

Sex: Female (mandibular and infracranial morphology).

Stature: 152.4 ± . cm (5' 0") [left radius].

Completeness: Skull fragments and fragmentary infracranial skeleton. The skull is represented by the mandible missing the left ascending ramus, right posterior body and ramus, and maxillary teeth. Infracranial remains include a single vertebra, second metacarpal, left clavicle, proximal humeral shaft fragments, radii and ulnae midshafts, left femoral shaft and bilateral condyle fragments, distal tibial shafts, fibulae shafts, and the feet missing most phalanges.

Preservation: Fair - Poor. Teeth are brittle and have cracked and broken. The ends of all the long bones are very weathered or missing. No reconstruction was possible because of insufficient fragments. There is fresh damage to the right proximal tibia but no fragments are found. Bone color is tan mottled with brown. Some porcelain ring in the remains.

Additional human remains: A large (?male) navicular.

Dental Pathology: Premortem loss of the mandibular left second molar. There is a small occlusal caries on the mandibular left third molar. Wear in the mandibular first molars is to the pulp, while in other teeth the dentin is exposed. The maxillary central incisors have wear to the pulp on the lingual surface with only a small rim of enamel remaining at the cemento-enamel junction. Slight calculus is present on most teeth and slight alveolar resorption in most sockets of both jaws.

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the foot bones and the single vertebral facet.

Noteworthy Features: Advanced tooth wear.

Comments: Consistent with Pietrusewsky Skeleton #17. Photographs of the maxillary and mandibular tooth wear.

Burial Number: 1966 - 42 (I E 4)

Archaeological Context: Middle Period 8, square E4 and E4/D4, AD 110 cm, orientation S-SW. Body supine, hands over pelvis, feet side by side, skeleton substantially complete. Single pot placed alongside the feet. This burial was disturbed by Burials 43 and 44.

Age: Middle age (dental wear).

Sex: Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Incomplete skull. The mandible is missing the left coronoid process, right gonion, and anterior teeth. The third molar through the four premolar of the right maxilla are present.

Preservation: Fair. Incomplete. Reconstruction of the mandible and maxilla. The tooth roots are brittle and breaking off. Mud adheres to the bone and is hardened. No additional fragments are present although loss of the anterior chin is recent. Bone color is mottled tan and dark brown.

Additional human remains: Right maxillary alveolus of a larger person with two teeth *in situ* (Burial 42I - data were collected on the teeth).

Dental Pathology: Wear exposes the dentin in all teeth, including the third molars. There is slight rolled rim, slight alveolar resorption and slight calculus. There may be a caries on the buccal surface of the crown of the right maxillary second molar. The right mandibular canine has a polished facet on the labial surface of the crown. There are no signs of striations under magnification.

Cranial Pathology: No osteoarthritis of the mandibular condyles.

Skeletal Pathology:

Noteworthy Features:

Comments: Supposed to be Pietrusewsky Skeleton #61, but the infracranial remains were not found in 1993. Pietrusewsky (1974) states that the burial was unnumbered in the field and was labelled "I E 4". Found in 1993, a piece of paper bag with skull fragments "NP7 E4 human upper jaw from fill of ~~6a~~ (crossed out and circle 13 with initials RHP) pit cross section in E baulk 28/1/66" "See notebook VI 9 28/1/66 and Notebook V 27/1/66 15". Photographs: tooth wear, possible mandibular torus.

Burial Number: 1966 - 43

Archaeological Context: Middle Period 7, square E4 and F4/F5, AD 115 cm. Body supine, hands alongside pelvis, feet slightly disturbed by Burial 42. Skull appears disarticulated prior to burial and placed beyond and slightly right of the neck. Three vessels beyond head, one vessel as sherd sheet under right arm, the other to the right of head. Clay spindle whorl (association doubtful).

Age: 35 - 40 years (auricular and pubic symphysis morphology).

Sex: Female (cranial and infracranial morphology).

Stature: 160.8 ± 3.0 cm (5' 3¼") [left femur].

Completeness: Nearly complete skull and moderately complete infracranial skeleton. The skull is missing the nasal bones, small fragments of the superior maxilla, and sphenoid body. Infracranial remains are missing the left ulna, ends of the clavicles, some carpals and hand phalanges, right distal femur, patellae, tibiae, fibulae, feet, cervical vertebral bodies, many thoracic vertebral bodies and arches, some lumbar arches, and some rib heads.

Preservation: Good. The skull was completely reconstructed without distortion and no remaining fragments. Some reconstruction of the vertebrae and most long limb bones. The ribs are very fragmentary and could not be reconstructed. Some ribs *en bloc*. The second cervical vertebra has rocky concretions which could not be removed. Bone color is mottled tan-black-yellow and texture is coarse. The hand bones are mineralized with a porcelain ring.

Additional human remains: ?Male glenoid and scapular fragment, and a left occipital condyle. Incomplete cranial vault fragments, *os coxae*, and vertebral fragments assigned Burial 43A.

Dental Pathology: Premortem loss of the mandibular right third molar and the bilateral maxillary third molars. The left alveolus of the maxilla is still healing. The left mandibular third molar has complete destruction of the crown presumably from an occlusal caries. Slight rolled rim and slight alveolar resorption are noted in the posterior alveoli. Dental wear exposes the dentin in the anterior teeth and molars. There are polished facets on the labial surface of the maxillary left canine and all incisors. The right lateral incisor has a faint semi-circular groove or depression at the mid-crown which is more easily felt than seen. The central incisors are symmetrically flattened on the labial side with dentin exposure in the lower crown surface. The left lateral incisor has a semicircular groove of the lower crown with dentin exposure and the left canine has a semi-circular groove of the lower crown. The left central incisor also has a notch on the occlusal edge of the labial crown which does not involve the buccal crown. No striations can be seen under the microscope.

Cranial Pathology: There are three large foramina (0.5 - 0.7 mm) in the body of the left sphenoid anterior to the superior spheno-temporal suture. There is no reactive bone formation and the area is not raised. Cranial vault thickness measurements range from 5 - 9 mm, without porosis or cribra orbitalia

Skeletal Pathology: Slight osteoarthritis of the spine and right shoulder. Bilateral preauricular sulci suggest childbirth. No dorsal pubic pitting but erosion of the anterior ventral rim.

Noteworthy Features: The basilar portion of the occipital has possible cutmarks which are parallel to each other, oblique to the midline and occur on the exterior surface of the basilar extension, posterior to the right condyle and around the right mastoid process. There are also a series of three cut marks (4 mm long), separated by 1 mm, on the right mid-frontal. No cutmarks were found on the mandible or first two cervical vertebrae.

Comments: Supposed to be Pietrusewsky Skeleton #4, but lower legs now missing. The excavators noted that the skull was apparently disarticulated and placed to the side, evaluation of the available axis and atlas fragments do not show any cutmarks but concretions are present in some areas. The first cervical vertebral fragment appears to fit the skull. Aging: Pubic symphysis Gilbert $\Sigma 14$ 55.7±3.24, Todd IX 45-50, Suchey V 48.1±14.6; Auricular surface IV-V 35-44; Cranial suture closure post. $\Sigma \geq 4$ $\geq$34.7±7.8, ant. $\Sigma \geq 2$ $\geq$36.2±6.2. Skull appears much younger than pubic symphysis ag, and dental wear also seems younger. Radiographs: left femur, humeri, left radius, skull. Photographs: teeth, sphenoid porosis, cut marks, pubic symphysis.

Burial Number: 1966 - 43A

Archaeological Context: Sorted from Burial 43

Age: Adult (infracranial bone size).

Sex: ?Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Incomplete cranial vault and few infracranial remains. Present from the cranium are the left frontal, fragments of the left parietal; left occipital, temporal and zygoma. Infracranial remains include a vertebral body fragment, cervical vertebral body, and a fragment of the iliac blade.

Preservation: Fair. Incomplete, but reconstruction was possible. Infracranial remains poorly preserved. with hard concretions filling the auditory meatus for example and covering some of the vault fragments. Other fragments feel waxy and polished. Bone color is brown with some black mottling.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: No thickening or porosis, no cribra orbitalia.

Skeletal Pathology:

Noteworthy Features: Complete metopic suture.

Comments: Duplicate cranial material for Burial 43. Photographs: metopic suture.

Burial Number: 1966 - 44

Archaeological Context: Middle Period 7?, square E4, northwest quadrant, AD 115 cm, orientation W-NW. Body apparently supine, but so disturbed by Burials 43 and 42 that exact position is unknown. Major portions of both skeletons present.

Age: Middle age (vertebral osteoarthritis).

Sex: Female (frontal and infracranial bone morphology).

Stature: 158.0 ± 3.5 cm (5' 2½") [left tibia].

Completeness: Cranial fragments and partial infracranial skeleton. The frontal is intact, a single parietal fragment, a portion of the central occipital, and a single tooth are present. Infracranial remains include right humeral shaft fragments, right scapula, clavicle, distal left humeral shaft, complete left ulna, proximal right ulna and shaft fragment, left radius shaft, left second metacarpal, left proximal femur, right patella, tibiae, fibulae, nearly complete feet, sacral body, first lumbar body, some cervical vertebral arches, and bilateral rib fragments.

Preservation: Good - Fair. The frontal was reconstructed and no additional fragments are present. The lower leg bones are well preserved, some additional reconstruction of the long limb bones was accomplished. The upper portion of the skeleton is less well preserved with fragmentation and weathering. Cranial bone color is light tan, texture is coarse with some hard concretions on the frontal. Infracranial bone color is mottled tan and black with few concretions. The bones have a porcelain ring.

Additional human remains: Cranial vault fragments of a subadult (Burial 44A); adult left proximal ulna and radii fragments, left second metatarsal, four right metatarsals and four foot phalanges.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 6 - 8 mm, without porosis or cribra orbitalia.

Skeletal Pathology: Slight osteoarthritis of the proximal ulna and foot bones. Moderate porosis and osteophytosis of the lumbar vertebral bodies and the superior sacral fragment. The first metatarsals have slight proximal extensions of the distal articular surfaces

Noteworthy Features: The calcanea have enlarged medial tubercles on the inferior surfaces which are slightly extended anteriorly and are inflated laterally. There is a well marked peroneal tubercle on the left calcaneus and none on the right.

Comments: The cranial box was found labelled "54 - mother and child" - but this is incorrect: Burial 44 is the mother and child. Subadult material found in this box matched other fragments found in a box labelled "III E 4" which is reported by Pietrusewsky (1974) as Burial 44. Consistent with Pietrusewsky Skeleton #82. Radiograph: ulnae, tibiae.

Burial Number: 1966 - 44A

Archaeological Context: Middle Period 7, square E4, northwest quadrant, AD 115 cm, orientation W-NW. Body apparently supine but disturbed by Burials 43 and 42 so position unknown.

Age: 8 - 9 years (8 - 9 dental eruption; 6.5 - 7 years diaphyseal lengths).

Sex: ?Male (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Moderately complete skull and infracranial skeleton. The cranial vault includes fragments of the frontal, parietal, right temporal, and right maxilla. The mandible is missing the right ascending ramus. Infracranial remains are missing portions of the scapula and clavicles, sternal elements, most thoracic and lumbar vertebrae, much of the left innominate, most carpals, most metacarpals and phalanges of the right hand, the distal femora, right tibia, and most of the foot bones except the talus.

Preservation: Fair - Poor. Reconstruction of the frontal, right parietal and occipital was accomplished but insufficient fragments are present to complete the vault. The infracranial remains are blackened and very weathered. Reconstruction of the humeral and forearm shafts, but the lower long limb bones could not be restored. There are insufficient fragments to complete reconstruction. Weathering of the epiphyseal ends of the long bones. Bone color is mottled tan and black, texture is coarse with some concretions and a porcelain ring.

Additional human remains: An adult left distal fibula - ?Burial 44.

Dental Pathology: Mixed dentition. Deciduous tooth wear exposes the dentin while permanent tooth wear has polished facets of the enamel only. Faint horizontal lines of enamel hypoplasia in the permanent maxillary canine (4.4 years), the third premolar (4.1 years), the first molar (2.6 years) and the incisors (cluster around 1.5 years).

Cranial Pathology: Cranial vault thickness measurements range from 3 - 5 mm.

Skeletal Pathology: None noted.

Noteworthy Features: The bones appear gracile and long. Marked shovel-shaping of the permanent maxillary central incisors.

Comments: The cranial box was found labelled "54 - mother and child" - but this is incorrect: Burial 44 is the mother and child. Subadult material found in this box matched other fragments found in a box labelled "III E 4" which is as reported by Pietrusewsky (1974) for Burial 44. Consistent with Pietrusewsky Skeleton #80. Photographs: hypoplasia, tooth eruption, maxillary shoveling, right ilium. Radiographs: humeri, left radius and ulnae.

Burial Number: 1966 - 45

Archaeological Context: Middle Period 7, square E6, center and east quadrant, AD 90 cm, orientation north-NW. Body apparently supine, but only legs and feet present. Sherd sheet under feet and a second pot placed beyond them. Bone in poor condition due to erosion and exposure.

Age: Adult (size, epiphyseal fusion).

Sex: ?Male (infracranial bone size).

Stature: Cannot be determined.

Completeness: Incomplete leg bones. Present are the shaft of the right femur, right tibial midshaft, distal right fibula, tali fragments, calcaneal fragments, right proximal fifth metatarsal and two metatarsal shafts, patellae *en bloc*, and a long limb bone shaft fragment (?humerus).

Preservation: Poor. The bone is extremely soft, crumbly and fragile, but some reconstruction of the femoral and tibial shafts was possible. Bone and dirt excavated together. Dirt penetrates all the trabeculae. The bone shaft fragment (?humerus) exhibits old gouges and slash marks consistent with disturbance. No porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: No osteoarthritis noted.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #68. Little information could be gained from these remains.

Burial Number: 1966 - 46

Archaeological Context: Middle Period 7, square C6, northeast quadrant, AD 125 cm, orientation W-SW. Body supine, hands alongside pelvis, skull crushed, ankles and feet removed by a later disturbance.

Age: 3 - 4 years (dental eruption).

Sex: ?Male (ilium and mandibular morphology).

Stature: Cannot be determined.

Completeness: Partial skull and moderately complete infracranial skeleton. Present from the skull are the frontal missing the lateral portions, right parietal missing the center, left parietal, occipital missing the *pars basilaris* and *pars lateralis*, temporals, right maxilla, zygomas, central and right mandibular body and ramus, and loose teeth. The infracranial remains include fragments of the left clavicle and scapula, left humeral diaphysis missing the ends, left radial diaphysis missing the proximal end, left proximal ulnar diaphysis, right humeral diaphyseal fragment, right proximal radius and ulna, fragment of the left ilium at the sciatic notch, left femur, right femoral diaphysis missing the ends, left proximal tibial diaphysis, right tibial diaphysis, left fibular diaphysis, four metacarpal shafts and proximal phalanges, few rib fragments, and a single ?sacral vertebral body.

Preservation: Fair. The cranial vault required reconstruction from small fragments with insufficient fragments for complete restoration. There is little weathering. Most of the breakage is old. Reconstruction of the shafts of the diaphyses was possible, but most of the metaphyseal ends are weathered. Few epiphyses, rib and vertebra are preserved. Cranial bone color is mottle light tan, tan-brown, and black. In the infracranial remains, bone color is mottled white-black, with a smooth texture. All bone has a porcelain ring.

Associated Cultural/Faunal Remains: Five large fragments of pottery.

Dental Pathology: Slight enamel attrition of the deciduous dentition. Some brown staining on the lingual surfaces of the teeth. The unerupted permanent teeth are uniformly stained a light brown.

Cranial Pathology: Cranial vault thickness is 3 mm at all points.

Skeletal Pathology: None noted.

Noteworthy Features: ?*os inca* bone.

Comments: In 1993 found labelled "77D" "D5 and C5" and assigned here based on description of Pietrusewsky Skeleton #38. Photographs: right maxillary dentition. Radiographs: left femur, left radius.

Burial Number: 1966 - 47

Archaeological Context: Middle Period 8?, square C3; north quadrant, AD 100 cm, orientation S-SW. Body supine, left arm and vertebrae intact but rest fragmentary due to later disturbance. Body from waist down in the north baulk and not excavated.

Age: Middle-age (epiphyseal fusion and osteoarthritis).

Sex: Female (humeral length).

Stature: 152.2 ± . cm (4' 12") [left humerus]

Completeness: Partial skull and incomplete infracranial skeleton. The skull includes the mandible missing the left condyle, with loose anterior teeth; right maxilla, right zygoma, incomplete right and left temporals, and fragments of the occipital condyles. Present from the infracranial skeleton are the left clavicle, fragments of the right distal clavicle, left humerus, left proximal radius and ulna, left scapula fragment, fragments of the seven cervical vertebrae, upper six thoracic vertebrae, left patella, and some rib fragments primarily from the left side with a few from the right.

Preservation: Fair. There is a grey mud hardened on and in all elements. There is a blue-green stain on the right maxillary central incisor and the mandibular central incisors. In the maxillary incisor the stain is horizontal along the lower crown labial surface while in the mandibular incisors the stain is vertical along the distal surface of the labial crowns. The humerus has cleaning scrapes. The cervical vertebrae are well preserved, while others were reconstructed. The ribs are fragmentary, and many have concretions. Bone color is grey-tan-brown with some of the ribs blackened. The bones have a porcelain ring and most of the breakage is old.

Additional human remains: A subadult mandibular incisor crown, duplicate cervical fragments.

Dental Pathology: Premortem loss of the right mandibular first molar. A large occlusal caries of the lower right third molar and the maxillary left third molar. Caries of the interproximal crown on the mandibular right fourth premolar, second molar and left third molar; and maxillary left fourth premolar. Dental wear exposes the dentin in the mandibular and maxillary incisors and the mandibular left first molar, while other teeth have enamel wear only.

Cranial Pathology: None noted.

Skeletal Pathology: The medial surface of the left patella has a porotic line along the middle crest. There is slight osteoarthritis of the vertebral column. The inferior facets of the seventh cervical vertebra are "rolled" posteriorly and superiorly indicating some loss of disc space between the seventh cervical and first thoracic vertebra.

The body of the first thoracic vertebra is missing. The body of the second thoracic vertebra is missing the majority of the superior end-plate and a small section of the inferior posterior left end-plate because of expansive lytic lesions. The interior of the defect appears to be smooth-walled cortical bone but observation is complicated by preservation and concretions. Radiograph demonstrate loss of the anterior end-plate superiorly and the majority of the body. The superior end-plate appears sclerotic relative to the other vertebrae. On the lateral view, the expansive nature of the defect is visible, the borders are ill defined but the defect is circular. The third thoracic vertebra is missing the anterior body, with poorly demarcated edges, a scalloped effect, and no sclerosis. Possible infectious lesions (e.g. tuberculosis).

Noteworthy Features: The left patella has a medial extension.

Comments: The cranial material is assigned here from a box labelled "I C 3" (see Pietrusewsky Skeleton #65). Radiographs: vertebrae, left humerus. Photographs: blue-green tooth stains, seventh cervical vertebra, first and second thoracic vertebrae and patella.

Burial Number: 1966 - 48

Archaeological Context: Middle Period 4??, square E5, northwest quadrant, AD 130 cm, orientation W-SW. Body supine, hands under pelvis. Beneath Burial 19, but not disturbed by it. Three pots found beyond feet and an immature *sus* radius.

Age: 35 - 40 years (cranial suture fusion, auricular and pubic symphysis morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 162.8 ± 4.0 cm (5' 4") [left femur].

Completeness: Nearly complete skull and infracranial skeleton. The skull is missing the upper maxilla, zygomatic processes, and nasal processes. Infracranial remains are missing some of the scapular blades, sternal ends of the ribs, most carpals, right fourth metacarpal, all distal and most middle phalanges, all middle and most distal foot phalanges, and one vertebral body.

Preservation: Good. The skull vault was reconstructed with good result and only slight distortion at the bregma. The mandible is complete and the maxillary dentition is complete, but the face could not be restored. The long bones are complete after reconstruction. Some weathering of the hand and foot bones and *os coxae*. Ribs are fragmented. The bone color is tan with mottled brown stains. There is a porcelain ring.

Additional human remains: ?fetal tibial diaphysis (length 51).

Dental Pathology: Slight to moderate calculus on the teeth, and slight to moderate alveolar resorption and slight rolled rim in the mandibular sockets. Hypoplasia in the maxillary and mandibular molars (2.5-3.0 years), premolars (4.5 - 6.0 years) and molars (2.5 years and around 6 years). Small occlusal pit caries of the maxillary right second molar and interproximal caries of the maxillary second molars. Dentin is exposed in the anterior teeth.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 9 mm. Coarse porosis of the superior vault which appears more remodeled anteriorly than posteriorly. The porosis ranges up to 0.5 mm in diameter, does not perforate the outer table in the frontal and anterior parietals, but does perforate the posterior bones. The cortical surface has a irregular texture but there is no active bone formation. There are bilateral small defects at the tympanic ring with some surrounding porosity. The defects are small openings of the outer cortex right at the fusion of the tympanic ring and the temporal.

Skeletal Pathology: Slight osteoarthritis of the appendicular skeleton. Slight porosis and osteoporosis of the thoracic and cervical vertebral bodies. Some rolling of the inferior facets of the seventh cervical vertebra and the upper facets of the third thoracic vertebra. There is a porotic lesion (3 x 6 mm) of the superior surface of the navicular facet of the right second cuneiform. The articular surface is smoothly graded into the defect and there is no corresponding defect in the navicular.

Noteworthy Features: Patellar notch and medial extension. There is a small fossa at the base of the coronoid process of the mandible bilaterally. Anteriorly, below the premolars on the interior surface of the mandibular body there is a large impression of the bone which expands rather sharply. There is a small half-moon shaped depression of the interior body at the genial tubercle. Radiograph of the mandible fails to demonstrate these observations, although the mental foramina are visible bilaterally, each with a sclerotic posterior margin but without any demineralization. Radiograph of the femora revealed a small (4 mm), circular demineralized area on the lateral surface of the neck of the left femur.

The lesion has a poorly marginated internal border, a sclerotic external border, resembling a "cheerio" or doughnut. A similar lesion is observed in the right femoral neck. Possible femoral squatting facets which were not noticed in gross examination.

Comments: Infracranial remains found in a wooden box labelled "47" and another box labelled "48" glued together and formed a nearly complete skeleton which is consistent with the excavated Burial 48. Pietrusewsky (1974) did not discover the match and described two individuals (Skeleton #65 and #77). The sacral and acetabular fragments found in the skull box glue to these remains. Infracranial remains look female while skull is male. Aging: Pubic symphysis McKern $\Sigma 13$ 29.2±3.33, Todd VI 30-35, Suchey IV 35.2±9.4; Auricular surface IV 35-39; Cranial suture closure post. $\Sigma \geq 5$ ≥34.7±7.8, ant. $\Sigma \geq 0$ ≥32.0±8.3. Photographs: mandible, teeth, maxilla, alveolar resorption, patellae. Radiographs: femora, humeri, ulnae, radii, tibiae, fibula.

Burial Number: 1966 - 49

Archaeological Context: Middle Period 8?, square E4/F4, AD 95 cm, orientation SW. Overlying and dug into Burials 28 and 29, and mostly removed by later disturbances. Fragments of the skull and left leg recovered.

Age: 50 - 60 years (auricular surface morphology).

Sex: Female (cranial and infracranial morphology).

Stature: 149.3 ± 6.4 cm (4'10¾") [segment left femur].

Completeness: Partial cranium and fragmentary infracranial skeleton. The cranial vault is represented by the frontal, right parietal and fragments of the occipital and temporals. Infracranial remains include the left *os coxae*, left femur missing the distal end, left patella, left tibial shaft fragments, left proximal fibular shaft fragment, sacral body, thoracic vertebral body, three left carpals, first through the fourth metacarpals, and an ulnar shaft fragment.

Preservation: Poor. Incomplete and fragmentary. The cranial vault bones were minimally restored. The infracranial remains have much old breakage, there are insufficient fragments for reconstruction. Weathering of all bones. The tibial shaft is crushed and excavated *en bloc*. Bone color is mottled black and tan, with a light grey mud adherent on cranial fragments. Porcelain ring in the cranial bones.

Additional human remains: None. **Dental Pathology:**

Cranial Pathology: No cribra orbitalia or porosis noted. Cranial vault thickness measurements range from 5 - 7 mm. The cranial vault is extremely small, bifrontal width is 103 mm.

Skeletal Pathology: Preauricular sulcus suggesting childbirth. Slight to moderate osteoarthritis of the hip and moderate porosis of the sacral body.

Noteworthy Features: The anterior femur has strongly marked ligament insertions.

Comments: Consistent with Pietrusewsky Skeleton #7, with change in age. Aging: Auricular surface VII 50-60; Cranial suture closure post. $\Sigma \geq 9$ ≥39.4±9.1, ant. $\Sigma \geq 7$ ≥45.5±8.9, Photograph of the sacral body, auricular surface.

Burial Number: 1966 - 50

Archaeological Context: Middle Period 4?, square D5, northwest quadrant, AD 125 cm, orientation N-S?. Body disturbed by later pits. Only a few fragments of the left side long bones, pelvis, vertebrae recovered. Two pots also recovered.

Age: 40 - 45 years (auricular and pubic symphysis morphology).

Sex: Male (infracranial and *os coxae* morphology).

Stature: 172.7 ± . cm (5' 8") [left radius].

Completeness: Partial infracranial skeleton. Present are the left scapula at the glenoid and acromion, left humeral fragments, left radius, left ulna; left hamate, capitate, three metacarpals and two phalanges; left pubic symphysis, right iliac fragments, right femoral head, left proximal femur, sacrum, and the fifth through the second lumbar vertebrae.

Preservation: Fair. There is a fresh break of the distal femur straight across but no fragments present. Some reconstruction was possible of the vertebrae, left femur, and acetabula, but there are insufficient fragments to complete the humerus. The only complete bone is the left radius. Cleaning marks and cuts on the distal clavicle, and gouges in the right auricular and femoral head. Bone color is tan with some brown mottling.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the left shoulder and elbow, and right hip. The lumbar vertebrae have slight facet osteoarthritis.

Noteworthy Features: Signs of old and recent disturbance of the remains are many: the missing elements, a fresh break of the left femur midshaft, and cleaning marks and cuts. The right femoral head has two cut-marks anterior of the *fovea capitis*, which meet each other to form a chevron (15 x 2 mm and 14 x 4 mm). The superior edge of the mark is sharp and descends directly into the deepest portion of the cut, while the lower edge is more broken and irregular. The right auricular surface also has a deep cut-mark (10 x 2 mm) in the center of the surface. Well marked bicipital groove of the humeral head. Humeral facet on the acromion process.

Comments: Consistent with Pietrusewsky Skeleton #55. Large animal bone fragment (?condyle) sorted from the human remains. Aging: Pubic symphysis McKern Σ14 35.8±3.89, Todd VIII 39-44, Suchey IV-V 35.2-45.6±10.4; Auricular surface V 40-44. Photographs: pubic symphysis, auricular surface, "cut-marks", humeral facet. Radiographs: left radius.

Burial Number: 1966 - 51

Archaeological Context: Middle Period 8?, square D5/E5, AD 100 cm, orientation SW. Fragments of the long leg bones recovered. Badly disturbed burial. Single pot is present but the association is doubtful.

Age: Adult (epiphyseal fusion).

Sex: ?Male (infracranial bone size).

Stature: 163.8 ± 8.2 cm (5' 4½") [segment left femur].

Completeness: Partial infracranial skeleton. Identified are a few carpals and proximal metacarpals, the femoral shafts, femoral head, tibial shafts, right patella, fibular shaft fragments, and some *os coxae* fragments.

Preservation: Fair - Poor. The bone is very soft and fragile, breaking apart easily. Solid black dirt holding many pieces together, when exposed to water, bone and mud falls apart. Some reconstruction of the tibial and femoral shafts was possible but none could be completed. The epiphyseal bone is poorly preserved. There are cleaning marks on the femoral shafts. The bone color is tan.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: The tibiae are poorly preserved and in fragments, with limited reconstruction producing shaft fragments approximately 200 mm in length. There is a large remodelled callus formation of the midshaft of the right tibia with a large phalange of remodeled bone extending medially. In the lateral view, there is evidence of overlap of the fragments with angulation of the distal fragment 20° apex anterior. There is a large groove on the lateral surface of the thickened area which extends 43 mm distally and is anterior to the interosseous line. In the anterior view there is little lateral angulation. Radiograph of the tibial shafts demonstrates complete remedullarization of the right tibia, but the marrow cavity is narrowed and the cortex is thickened both posteriorly and anteriorly. The lateral view shows the superior fragment is angulated posteriorly, leaving a ridge of remodelled bone at the anterior spine. Healed mid-shaft tibia fracture.

The right patella is markedly osteoarthritic with a grossly expanded articular surface. A fragment of the femoral condyle is present (?right side) which exhibits moderate osteoarthritic changes of the lateral edge of the surface. There are few fragments of the fibulae which appear slightly distorted in that there is a marked groove on the medial surface but little else can be evaluated. Probable healed fracture of the midshaft of the right tibia, with shortening, and secondary osteoarthritis of the right knee.

Noteworthy Features: Large skeletal remains.

Comments: Consistent with Pietrusewsky Skeleton #44. Photographs: right tibia, patella, condyle fragment. Radiographs: right tibia.

Burial Number: 1966 - 52

Archaeological Context: Middle Period 8?, square D5/E5, AD 100 cm, orientation SW. Only fragments of the leg bones were recovered, rest of burial removed by later disturbance.

Age: at least 7 - 8 years (estimated diaphyseal length fibula).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Incomplete leg bones. Incomplete femoral diaphyses (right 170 mm, and left 201 mm); nearly complete left fibular diaphysis, and right fibular diaphyseal fragment.

Preservation: Poor. Incomplete and fragmentary remains. No reconstruction possible from the fragments available. Breakage is both old and new. The bone color is tan-orange, with some mottled black color. Bone texture is smooth and light.

Additional human remains:

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments: Skeletal remains of three different individuals were found in the wooden box labelled "52" (See Burials 27 and 64). Closest match is Pietrusewsky Skeleton #59, but tibiae are missing. Photographs: metatarsals. Radiographs: metatarsals, fibulae, left tibial and left ulnar diaphyses.

Burial Number: 1966 - 53

Archaeological Context: Middle Period 3?, square E6, west quadrant, AD 135 cm, orientation W-SW. Body supine, hands apparently on pelvis, feet together with four pots placed over them. Skull and thorax in the E6 west baulk and not excavated. Bone is in poor shape.

Age: Adult (epiphyseal fusion and bone size).

Sex: ?Female (infracranial morphology).

Stature: 160.3 ± 6.6 cm (5' 3") [segment right femur].

Completeness: Incomplete infracranial skeleton. Present are fragments of the left distal humerus, radial head, *os coxae*, right proximal femur and distal fragment, left femoral head and proximal shaft fragment, femoral condyles, right proximal tibia and distal tibial shaft, left tibial anterior spine fragment, right proximal fifth metatarsal; left talus, calcaneus, navicular, second cuneiform, fragment of the first metatarsal, proximal ends of the second and third metatarsals, and three phalanges.

Preservation: Poor. All bones are fragmentary and weathered. Much of the skeleton is missing from disturbances so little reconstruction was possible. The left femur is coarsely textured while most bone is soft and chalky and crumbles to the touch.. Bone color ranges from white to tan. The distal right tibia is tan and solid in color while portions of the fibula are reddish-brown in color. No porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Osteoarthritis is slight in the appendicular skeleton, including the right hip and tibial plateau.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #20.

Burial Number: 1966 - 54

Archaeological Context: Middle Period 2?, square D4/D5, AD 140 cm. Body supine, only the lower left arm, sacral vertebrae, pelvis, and legs present. Upper body disturbed by Burial 63. Pots placed over feet and to the right of the legs.

Age: 50 - 60 years (auricular surface morphology).

Sex: Female (infracranial and *os coxae* morphology).

Stature: 150.0 ± . cm (4' 11") [left radius].

Completeness: Partial infracranial skeleton. Present are the left proximal humerus, radius, and ulna; left metacarpals and phalanges, right metacarpals and phalanges, *os coxae* fragments; left femoral head, femoral shafts, and condyle fragments; left patella, tibial and fibular shafts, tali, calcanea, right navicular and cuneiforms, cuboid, three left metatarsals missing the heads, two right metatarsals, sacrum, and lumbar vertebral fragments.

Preservation: Fair - poor. The upper arm bones are well preserved and complete while the other infracranial remains are fragmentary and weathered. There are few additional fragments. Little reconstruction was possible. Bone color is mottled brown-black with a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the appendicular skeleton. There is moderate lipping across the anterior of the second lumbar superior end-plate. Preauricular sulcus indicates childbirth.

Noteworthy Features: Slight extension of the medial side of the first metatarsal.

Comments: Consistent with Pietrusewsky Skeleton #22. Aging: Auricular surface VII 50-59. Photographs: vertebrae. Radiographs: left ulna and radius.

Burial Number: 1966 - 55

Archaeological Context: Middle Period 3, square E5 and D5/E5, AD 140 cm, orientation SW. Body supine, hands alongside pelvis, ribs and vertebrae disarticulated. Pots beyond head and feet, near knees.

Age: 35 - 40 years (auricular surface morphology and cranial suture fusion).

Sex: Male (skull and *os coxae* morphology).

Stature: 170.2 ± 4.0 cm (5' 7") [left femur].

Completeness: Nearly complete skull and substantially complete infracranial skeleton. The skull is missing the mandibular incisors, the maxillary incisors and canines, and fragments of the occiput. Infracranial remains are missing the sternum, manubrium, sternal rib ends, most carpals, right *os coxae*, foot phalanges, and second cuneiforms.

Preservation: Good - Fair. The cranium was reconstructed but the face could not be restored. The mandible was reconstructed at the midline and right condyle. Ribs are poorly preserved. The long bones required reconstruction. Bone is mottled tan and black, coarse textured and has a porcelain ring.

Additional human remains: Second cervical vertebra of a smaller person, sacral fragment.

Dental Pathology: Abscessing of the left first molar socket of the mandible and the right first molar socket of the maxilla. Dental wear has flattened all cusps and exposed dentin in the molars. The right mandibular canine has asymmetric wear of the occlusal crown which slants down the labial surface. Calculus and rolled rim are moderate. There is a greenish blue stain on the buccal surfaces of the mandibular teeth which appears above the level of the calculus, and on the labial surface of the maxillary incisors. Dental enamel hypoplasia in the maxillary canine (3.5 years), premolars (4.5 to 5.0 years) and molars (1.5 and 5.5 years).

Cranial Pathology: Cranial vault thickness measurements range from 5 - 11 mm.

Skeletal Pathology: Slight osteoarthritis of the appendicular and vertebral skeleton. The bilateral femora have cortical defects of the posterior-medial distal shafts. The circular erosion exposing trabecular bone is 10 mm diameter on the left side and 10 x 13 mm on the right. The left scapula is incomplete but the leading edge of the acromion process is porotic, flattened and slightly expanded suggesting a possible unfused acromial epiphysis. The loose epiphysis could not be identified and the right side is not available for comparison. Deep (5 mm across and 7 mm deep) circular ?Schmorl's node of the fifth lumbar vertebra. The left clavicle is thicker in the anterior-posterior plane when compared to the right side, which is caused by a flattening of the superior-inferior dimension of the shaft. Radiograph of the two clavicles is normal in appearance, although the asymmetry is evident.

Noteworthy Features: The maxillary canines have been lost post-mortem, but the sockets are very small and circular in shape suggesting possible peg-shaped canines or retained deciduous canines. There are many cutmarks perpendicular to the long axis of the right tibia on the lateral border of the distal third of the shaft. The marks are 9 mm in length and approximately 4 - 5 mm apart.

Comments: Consistent with Pietrusewsky Skeleton #51. Aging: Auricular surface IV 35-39; Cranial suture closure post. $\Sigma \geq 3$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 3$ $\geq 41.1 \pm 10.0$. Photographs: tooth stains, hypoplasia, tooth sockets, distal cortical defects, fifth lumbar vertebra, clavicles, scapula, patellae, cutmarks. Radiographs: skull, maxilla, femora, tibiae, right ulna, right humerus, fifth lumbar vertebra.

Burial Number: 1966 - 56

Archaeological Context: Middle Period 3, squares D5 and D5/E5 and D6/E6, AD 150 cm, orientation SW. Body supine, feet together, knees parted. Only lower femora and lower legs in excavation area, remainder unexcavated. Smashed bowl under feet and a second vessel beyond, and *bibos* mandible associated.

Age: 11 - 12 years (diaphyseal length).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Incomplete leg bones. Present are the distal right femoral diaphysis and distal epiphysis, right tibial diaphysis with epiphyses, left tibial diaphysis with distal epiphysis, fibular diaphyses with proximal epiphyses, tali, calcanea, navicular, right third cuneiform, first through fifth metatarsals, and eight proximal and middle phalanges.

Preservation: Good. Some reconstruction of the tibiae and fibular diaphyses. Weathering loss of the left lateral calcaneus. Some excavation/cleaning gouges. Bone color is tan with some black mottling. Bone texture is coarse and bone has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features: Gracile bones. The right fibular diaphysis is much more robust that the left, perhaps suggesting right-handedness.

Comments: Consistent with Pietrusewsky Skeleton #50. The diaphyseal lengths range is 11 - 12 years, but epiphyseal fusion suggests older (i.e. the posterior calcaneus and first metatarsal fuse between 14 - 16 years). Radiographs: right tibial diaphysis and fibular diaphyses.

.Burial Number: 1966 - 57

Archaeological Context: Middle Period 5, square D5 and C5, east quadrant, AD 135 cm, orientation N-NW. Body apparently supine, but bones in poor shape. Center of burial disturbed.

Age: 3 - 4 years (dental eruption).

Sex: ?Male (mandibular and iliac morphology).

Stature: Cannot be determined.

Completeness: Moderately complete infracranial skeleton and a few teeth. Missing are the right scapula, proximal humeral diaphyses, ends of the radii and ulnae diaphyses, hands, ends of the tibial diaphyses, fibulae, feet, and lower thoracic, lumbar, and sacral vertebrae.

Preservation: Fair. The bones are weathered, all metaphyseal and epiphyseal ends are either lost or are extremely fragile and damaged. The ribs are fragmentary and few vertebral bodies are preserved. Only a small amount of reconstruction was possible. Bone color is tan with some blackened areas of the ribs and long bones, especially the tibiae. The bone has a porcelain ring.

Additional human remains: None.

Dental Pathology: Dental wear in the deciduous teeth is of the enamel only, just a polishing. Hypoplasia of the left maxillary and the right mandibular canines. In the maxillary left canine there is an irregular area of the mesial surface of the labial crown which has enamel of reduced thickness. In the mandibular right canine, an irregular area on the lateral labial surface exhibits decreased enamel thickness. The other canines are not preserved. These defects may be LHPC (localized hypoplasia in the primary canine), which is attributable to mechanical force rather than physiological stress.

Cranial Pathology: There is a wormy appearance to the internal frontal but the external vault is smooth and without porosis. Post-depositional breakage does not show any periostitis or diplöic thickening. There is no cribra orbitalia. Cranial vault thickness measurement is 4 mm at the frontal eminence and lambda.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: In 1993, these remains were found in a wooden box labelled "Burial 1" and assigned here based on the description of Pietrusewsky Skeleton #19. Radiographs: left femur. Photographs: canine hypoplasias, ilium and tympanic plates, internal occipital.

Burial Number: 1966 - 58

Archaeological Context: Middle Period 5, square D4/E4, AD 135 cm, orientation N-NE. Body supine, hands apparently under pelvis, upper body and feet missing.

Age: 6 - 8 years (dental eruption and diaphyseal lengths).

Sex: ?Female (left ilium morphology).

Stature: Cannot be determined.

Completeness: Skull fragments and partial infracranial skeleton. The skull includes fragments of the occipital, petrous and parietals; fragments of the right mandibular ramus and posterior body, and right maxilla. Infracranial remains include proximal right radius and ulna diaphyses, right humeral diaphysis, the tibiae diaphyses, fibulae diaphyses, femoral diaphyses, ilium and ischium fragments, few rib fragments, and lower lumbar and sacral vertebral fragments.

Preservation: Fair - Poor. No reconstruction possible of the skull bones. A few of the diaphyses are reconstructed to completeness, but most bones are extremely weathered and fragmentary. There are insufficient fragments to complete restoration. Bone color is mottled tan and black and smooth in texture. There is some porcelain ring to the smaller bones.

Additional human remains: An adult left clavicle, complete length 145 cm.

Dental Pathology: Deciduous dental attrition exposes the dentin in the maxillary molars. In the permanent teeth there is a light brown horizontal line on the maxillary right second molar with lighter colored enamel beneath it, measurement to the cemento-enamel junction suggests physiological stress at around age 6 years.

Cranial Pathology: None noted.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #11. Radiographs: right humerus and right femur. Photographs: hypoplasia.

Burial Number: 1966 - 59

Archaeological Context: Mound burial. Middle Period 2, square C3/C4, AD 160 cm, orientation N-NW. Body supine but middle portion slumped downward, traces of fiber mat under bones. Hands on pelvis. Skull apparently propped on something organic. Pots at head, large pot over knees, pot to left of ankles, pots beyond feet and two pots in mound as well as an immature *sus* forelimb and catfish spine.

Age: 40 - 45 years (cranial suture fusion and dental wear).

Sex: Female (skull and infracranial morphology).

Stature: 148.3 ± . cm (4' 10½") [left humerus].

Completeness: Moderately complete skull and infracranial skeleton. The skull is missing portions of the basiocciput, glabella region of the frontal, fragments of all bones of the vault, and some anterior teeth of both jaws. The infracranial remains are missing the right distal radius and ulna, left scapula, right distal clavicle, most hand bones, *os coxae*, distal femora, tibial plateaus, most of the right fibula, left patella, left metatarsals, most of the right and left tarsals, upper thoracic vertebrae, and most vertebral arches.

Preservation: Fair. Although most parts of the skeleton are represented, the cancellous bone is fragmentary and incomplete. Rock hard concretions are present on the cranial vault bones and mandible. Many of the tooth crowns have broken off and are lost. Concretions are many and affect all reconstructions, the cervical vertebrae are fused together by concretions. Bone color is tan with little mottling. Porcelain ring.

Additional human remains: First thoracic to fifth lumbar vertebral bodies and sacrum (Pietrusewsky Skeleton #13 - assigned to Burial 78), proximal right ulna of Burial 41, subadult right humeral and left proximal femoral diaphyses, adult male glenoid.

Dental Pathology: Difficult to assess premortem tooth loss because of the concretions filling the sockets. Abscessing of the mandibular right first and left second molar sockets, likely resulting from severe wear. Slight rolled rim of the mandibular third molar sockets. The left mandibular second molar has lost much of the posterior crown, due either to caries or wear. The anterior lateral teeth in the maxilla are worn to the roots.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 7 mm. Healed porosis of the posterior parietals. No cribra orbitalia.

Skeletal Pathology: Slight osteoarthritis, but spinal column difficult to assess because of concretions and .usions. The vertebral bodies are extremely light and fragile, possible osteoporosis. Slight dorsal extension of the lateral side of the distal facet of the first metatarsal.

Noteworthy Features: Sacralization of the fifth lumbar vertebra. Radiograph of the humerus demonstrates poor preservation as well as very thin cortical bone in this element.

Comments: Consistent with Pietrusewsky Skeleton #16, but intrusive spine not mentioned by excavators. Aging: Cranial suture closure post. $\Sigma \geq 4$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 5$ $\geq 41.1 \pm 10.0$. Photographs: mandibular tooth wear, sacrum, cervical spine. Radiographs: left humerus.

Burial Number: 1966 - 60: No skeletal material or grave goods encountered.

Burial Number: 1966 - 61

Archaeological Context: Middle Period 2 - 8??, square G4, east quadrant, orientation N-NE/S-SW?. One fibula and two tibial shafts remained in extensively disturbed burial. One small pot and a piece of red pigment separated from the bones by a later pit.

Age: 3 - 5 years (tibial diaphyseal fragment).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragments of the lower leg bones. Present are the right tibial diaphysis missing the ends; the fibulae diaphyses missing the ends.

Preservation: Fair. No reconstruction was possible since there are no bone fragments. The bone color is dark gray-brown, texture is smooth, with a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #52. Bayard (1984) adjusted temporal assignment to MP 1-2.

Burial Number: 1966 - 62

Archaeological Context: Middle Period 2, square G4 and F4/G4, AD 150 cm, orientation NE. Body supine, only skull and left side of burial extended into excavation area. Mound disturbed by the interment of Burial 78. Rib and arm fragments of a second individual were found in the mound.

Age: 50 - 55 years ((pubic symphysis, auricular surface and sternal rib end morphology).

Sex: Female (*os coxae* and infracranial skeleton morphology).

Stature: 149.7 ± 2.1 cm (4' 11") [left bicondylar femur and tibia].

Completeness: Partial cranium and infracranial skeleton. The cranium is missing the left frontal, inferior left parietal, left temporal, right maxillary incisors, and left maxilla. Missing from the infracranial remains are the right humerus, clavicles, scapulae, much of the left humerus, right radius, proximal left radius, most of the right hand, distal hand phalanges, cervical and thoracic vertebrae, ribs, sternum, manubrium, right ischium, pubis and iliac blade, right femur except for condyle fragment, and distal foot phalanges.

Preservation: Good - Fair. The cranial vault is reconstructed from large fragments with little distortion., and restoration of the right face to the vault. The hand and foot bones are well preserved. The long limb bone shafts were reconstructed. The vertebrae are fragmentary with old breakage and minimal reconstruction was possible. The auricular surfaces are well preserved. There is a thin grey mud veneer which is not removed by water and a tooth brush on most of the remains. The cranium color is light grey-tan and smooth to the touch, while the infracranial remains are grey with black mottling. There is a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology: The maxillary right third molar crown is destroyed by caries. Alveolar resorption is moderate in the maxillary right fourth premolar socket. Dental wear exposes the dentin in all the teeth present. The right maxillary third premolar crown has a flattened labial surface at a 70° angle to the occlusal surface. Under magnification the flattened surface appears coarse and uneven and there are no indications of striations. There is wear of the posterior half of the occlusal surface, leaving the center of the crown as the highest point. Possible worn chip fracture or filing.

Cranial Pathology: No porosis observed, cranial vault thickness measurements range from 4 - 6 mm.

Skeletal Pathology: Moderate osteoarthritis of the femoral condyles, patellae, and first metatarsals. Moderate osteoarthritis of the left patella with ossific nodules and porosis of the interarticular ridge and slight lipping of the medial articular rim. The medial condyle of the left femur exhibits a rolled and raised rim along the patellar articular surface and on the lateral surface posteriorly. The right first metatarsal proximal phalanx is preserved but the metatarsal is missing. The proximal articular surface of the phalanx is grossly expanded and there is a healed porosis of the center of the articular surface. The entire articular surface rim is sharpened and there is a proximally extending osteophyte on the inferior surface. The left side is only slightly affected. The left first metatarsal is present and has a coarse ridged extension of the distal articular surface on the dorsal side of the bone. Lumbar vertebrae with moderate osteoporosis and osteophytosis and minimal facet osteoarthritis. The body of the first sacral vertebra is partially preserved and exhibits moderate osteophytic lipping and porosis.

Noteworthy Features: Marked ventral rim on the pubic symphysis. Medial tubercle of the patellae.

Comments: Inconsistent with excavator's notes, but consistent with Pietrusewsky Skeleton #30. The remains found in the mound were not located (PS # 53). In 1993 these remains were found in a wooden box labelled "77". Review of measurements and photographs in Pietrusewsky (1974) show that these are not Burial 77. Also have a skull in a box labelled "77C", with two paper labels in the box: "NP7 G4 Burial 77 skull over legs 22-4-66" and "NP7 F4 Burial 77 right radius"; but neither of these proveniences is correct for Burial 77. Aging: Pubic symphysis Gilbert Σ15 55.7±3.24, Todd IX 45-50, Suchey V 48.1±14.6; Auricular surface VII-VIII 50-60+; Sternal rib end V 40.0±12.22.
Photographs: toes, femoral condyles, vertebral bodies, third premolar wear, caries, alveolar resorption.
Radiographs: patellae, left femur, right fibula and vertebrae.

Burial Number: 1966 - 63

Archaeological Context: Middle Period 3, square D5, south quadrant, AD 140 cm, orientation W-NW. Body supine, hands on pelvis. Skull found on lower legs with two clamshells where the skull should be (? decapitated). Sherd sheet beyond clamshells, with a pot nest further beyond and a pot over the thighs. Subadult cattle limbs laying on and at both sides of the lower body. Two bronze bracelets on the right wrist, three on the left. Burial dug into Burial 54.

Age: 25 - 30 years (auricular surface, clavicle fusion).

Sex: Female (*os coxae* and infracranial morphology).

Stature: 153.0 ± 3.0 cm (5' ¼") [left femur].

Completeness: Nearly complete skull and infracranial skeleton. The cranial vault is missing portions of the occiput near the asterion and opisthion, the right pterion, portions of the right posterior zygoma, and zygomatic processes. The mandible is missing the central incisors and the maxilla is missing the left lateral incisor. The infracranial remains are missing the right distal radius, most of the left hand, scapula bodies, sternum, manubrium, pubic rami, patellae, proximal left fibula, a few foot bones, and the first three cervical vertebrae.

Preservation: Good - Fair. The cranium is completely reconstructed with good result, although there is some distortion at the lambda. The mandible is reconstructed at the *symphysis menti*. The femora and right radius are completely restored. The vertebrae are fairly well preserved with a few arches and most processes weathered away. Most ends of the long bones are weathered. There are concretions on many of the bones, especially the foot and hand bones, which have been removed by cleaning, leaving cleaning marks. Green staining of the cortical bone of the radii and ulnae is visible at recent breaks. Bone color is light tan with dark mottling in the skull and the infracranial remains are mottled tan, white, black, and yellow. All bone has a porcelain ring.

Additional human remains: Left zygoma.

Dental Pathology: The mandibular third molars are impacted. Both are erupted but do not reach the occlusal plane. Buccal crown caries on the mandibular left third molar and occlusal caries on the mandibular right first and second molars. Hypoplasia in most teeth, in the form of horizontal lines with a whitish grey enamel below, suggesting physiological stresses at age 2.5-3.5 years and 4.5-5.5 years with other isolated hypoplasis in the interim years. Rolled rim is slight in the posterior mandibular tooth sockets. Wear exposes the dentin in the mandibular first molars and enamel in other teeth.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 6 mm.

Skeletal Pathology: Laminal spurring of the thoracic and lumbar vertebra. Slight lipping osteoarthritis of the facets of the vertebra. Preauricular sulcus bilaterally suggests childbirth. The proximal right fibula is expanded, with a smoothly graded, cortical bone phalange along the anterior-lateral border at the insertion of the *peroneus longus*. The left proximal fibula is not present. Radiograph of the right fibula reveals an erosive lesion of the metaphysis with an indistinct permeative border distally and an open character to the medullary bone. Slight sclerosis is evident on the superior tibial facet. The posterior-inferior surface of the left calcaneus is enlarged and expanded. The medial tubercle is large, but not extended and there is an additional tubercle-like expansion of the cortical bone anterior to the tubercles in the center of the calcaneal body. The right first metatarsal has a distal facet extension on the lateral side of the dorsal surface without porosis or lipping. The right clavicle has a posterior lipped spur of the rhomboid fossa which extends inferiorly perpendicular to the long axis of the bone. The left clavicle has a anteriorly extended spur of the anterior border of the shaft at the conoid tubercle. The clavicle shaft appears flattened and extended at this point. Radiograph of the clavicles documents the right is more robust than the left. The distal end of the left clavicle has an apparently sharper curve, but there is no evidence of angulation, shortening, sclerosis or other evidence of healed fracture.

Noteworthy Features: The thoracic vertebrae are very well preserved and there are apparently 13 thoracic elements. The thirteenth body has a small facet near the base of the left lateral process which may be a rib facet, and the posterior articular facets are transitional. The exact number of cervical vertebrae could not be determined. Sternal epiphysis of the left clavicle is unfused.

Comments: Skull incorrectly labelled Burial 54 - no cervical vertebrae present with the skull. Consistent with Pietrusewsky Skeleton #21, although facets in the maxillary incisors noted (Pietrusewsky 1974) were not evident in this skull. Decapitation while flesh remains on the body typically severs the neck at the mid-cervical region (McKinley 1993) while disarticulation, implying a more controlled surgical removal of the skull, or removal of the skull after skeletonization would be more likely at or near the first cervical vertebra. The absence of the first three cervical vertebrae in this case supports decapitation theory, but implies that the head was kept elsewhere until it skeletonized and was then added to the burial at a later date. Aging: Auricular surface II 25-29; Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: proximal fibula, clavicles, calcanea, mandibular teeth, hypoplasia and wear. Radiographs: femora, humeri, left ulna, cranial vault.

Burial Number: 1966 - 64

Archaeological Context: Early Period 1-2. AD 190 cm. Only skull fragments, fragments of the clavicle and vertebrae are recovered.

Age: 7 - 8 years (diaphyseal lengths). **Sex:** Unknown. **Stature:** Cannot be determined.

Completeness: Substantially complete long limb bones. Present are the humeral diaphyses missing the proximal ends, right ulna and radius fragments, femoral head epiphyses, femoral diaphyses fragments, right tibial midshaft diaphysis, left tibial diaphysis, left fibular diaphysis, tali, calcanei, metatarsals and foot phalanges.

Preservation: Fair. Reconstruction of the right fibula and right ulna to make complete diaphyses. There is fresh breakage of the right distal femoral diaphysis, but the fragments are not present. Weathering of the cancellous bones of the feet and epiphyses recovered. Bone is colored tan mottled black, and has a porcelain ring.

Additional human remains: None. **Dental Pathology:** **Cranial Pathology:**

Skeletal Pathology:

Noteworthy Features: Enlarged nutrient foramina of the left first metatarsal, right second and third metatarsals.

Comments: Inconsistent with archaeology and Pietrusewsky Skeleton #8. Photographs: metatarsals. Radiographs: fibulae, left tibial and left ulnar diaphyses, and left metatarsals.

Burial Number: 1966 - 65

Archaeological Context: Middle Period 4??, square F4, east quadrant, AD 155 cm, orientation SW. Body supine, only upper portion extended into excavation area. Pottery in fill near top of grave and a crude vessel at bottom of grave near head.

Age: 55+ years (cranial suture fusion).

Sex: Male (cranial and infracranial morphology).

Stature: 166.6 ± . cm (5' 5½") [segment left humerus].

Completeness: Partial skull and infracranial skeleton. The skull is represented by the mandible missing the right posterior body and ramus, the maxilla, right zygoma, and the cranial vault missing the frontal, most of the left parietal, inferior occipital, and sphenoid. Infracranial remains include the clavicles missing the ends, humeri with the heads detached, scapula body, proximal left radius and ulna, bilateral axial rib fragments, cervical and thoracic vertebrae, sternum, and manubrium.

Preservation: Fair. The cranial vault is reconstructed with some distortion. There are insufficient fragments to complete restoration. Concretions complicate observations of the dental pathology. Some reconstruction of the vertebrae possible but incomplete. The ribs are fragmentary. None of the long bones could be completely restored. Bone color is tan with some black mottling. There are grey mud concretions on the teeth, parts of the skull, and ribs.

Additional human remains: None

Dental Pathology: Extensive premortem tooth loss; all maxillary molars, the right central incisor and fourth premolar; mandibular fourth premolars and all molars are lost. Wear to the pulp in all remaining teeth. Calculus is marked on the mandibular right teeth. The maxillary left central incisor has wear of the lingual surface which includes the cemento-enamel junction, while the mandibular left canine and premolar are worn on the labial surface, suggesting an overbite with the jaws in occlusion.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 9 mm. Very slight, widely spaced, porosis of the external vault still visible at bregma but not posteriorly.

Skeletal Pathology: Marked osteoarthritis of the thoracic fifth-sixth vertebral interface with expansion and porosis of the end-plates, slight facet osteoarthritis and lipping of the rib heads and tubercles.

Noteworthy Features: Suprascapular spur/notch, robust humeri and clavicles, multiple mandibular foramina.

Comments: Consistent with Pietrusewsky Skeleton #78. Aging: Cranial suture closure post. $\sum \geq 16$ $\geq 48.8 \pm 10.5$, ant. $\sum \geq 10$ $\geq 51.9 \pm 12.5$. Photographs: posterior skull, inion, tympanic thickening, multiple mandibular foramina, tooth wear/loss, cervical vertebrae, spurred notch. Radiographs: skull, cervical vertebrae fifth and sixth.

Burial Number: 1966 - 66: Burial detected but not cleared or lifted.

Burial Number: 1966 - 67

Archaeological Context: Middle Period 2, square D5 and D4/D5, AD 150 cm, orientation SW. The body is supine, hands under pelvis, feet together. Adjoins Burial 54 but at a slightly lower level. One pot placed behind and to the right of the head, one pot in fill above feet, and an associated unifacial sandstone grindstone.

Age: 20 - 25 years (clavicle epiphyseal fusion, sternal rib end and auricular surface morphology).

Sex: Male (cranial and infracranial morphology).

Stature: 162.5 ± 4.0 cm (5' 4") [right femur].

Completeness: Moderately complete skull and substantially complete infracranial skeleton. The cranium appears complete but is not intact. The infracranial remains are missing much of the sternum, manubrium, most scapulae, distal ulnae, most carpals and metacarpals, left tibial plateau, right patella, symphysis pubis, right fibula, most of the left tarsals and metatarsals and phalanges, vertebral arches, and some ribs.

Preservation: Good. The cranial vault was reconstructed from many fragments with a good result, but the temporals and face could not be restored to the vault. The mandible was reconstructed but is incomplete. The maxilla is well preserved. Some reconstruction of the long limb bones was previously done. The ribs and vertebrae are fragmentary, many are missing, and were not reconstructed. Fairly severe concretions are present on the cranial vault and some infracranial remains, with cleaning marks present on most bones. Most breakage seems old rather than sustained at the time of excavation. Bone color is tan with some black mottling. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Wear exposes the dentin in the anterior teeth only and is just visible in the first molar. Slight calculus on most of the maxillary and mandibular teeth, with moderate calculus on the lower incisors. Slight rolled rim of the mandibular posterior sockets. Slight hypoplasia of the teeth of both jaws, clustering in the 2.5 to 4.0 year range. Three types of enamel hypoplasia are seen in this individual: circular groups of pits, a grayish band, and small grooves.

Cranial Pathology: Cranial vault thickness measurements range from 3 - 4 mm.

Skeletal Pathology: Slight osteoarthritis of the elbow and hands.

Noteworthy Features: Unfused medial clavicle epiphysis.

Comments: Consistent with Pietrusewsky Skeleton #86, with support from a note on the oblong shape of the maxillary third molars, but sex assignment changed. The left calcaneus and left fibula were found intrusive in Burial 84. Aging: Auricular surface I-II 20-30; Sternal rib end II 21.9±2.13; Cranial suture closure post. $\Sigma \geq 1$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Radiographs: femora, right tibia, humeri, radii. Photographs: dental wear, rolled rim, calculus, hypoplasia.

Burial Number: 1966 - Mound 68

Archaeological Context: Middle Period 1?, square D7, center and south quadrants, AD 115-25 cm, circular orientation. Mound cleared in last few days and primary burial not identified.

Age: Adult (infracranial bone size). **Sex:** Unknown. **Stature:** Cannot be determined.

Completeness: Fragments of a cranial vault. A partial right distal parietal, and some small cranial vault fragments.

Preservation: Fair. Reconstructed parietal fragment with some weathering of the edges. No concretions. Bone color is a deep brown, texture is smooth. Soft bone with a slight porcelain ring.

Additional human remains: None. **Dental Pathology:**

Cranial Pathology: Cranial vault thickening is 9 mm at the parietal eminence. Slight, nearly healed porosis at the posterior parietal.

Skeletal Pathology: **Noteworthy Features:**

Comments: Consistent with Pietrusewsky Skeleton #57, with reconstruction in 1993. Photographs: porosis.

Burial Number: 1966 - 69: Not lifted

Burial Number: 1966 - Mound 70

Archaeological Context: Middle Period 1?, square C7, north quadrant, AD 105 - 120 cm, E-W oval mound. Oval mound, covering most of square and extending into north baulk. Mound contained at least five vessels and three sherd sheets and some fragments. No burial was detected below the mound, but fragments of the legs and pelvis of an adult were found in the fill.

Age: Adult (infracranial bone size). **Sex:** Unknown. **Stature:** Cannot be determined.

Completeness: Fragmentary infracranial remains. Present are a femoral midshaft fragment, fibular shaft fragments, and an acetabular fragment.

Preservation: Poor. No reconstruction possible. One femoral fragment has a fresh break but no adjoining fragments are present. Breakage is old and new. The bone is soft and fragile with a coarse texture. Bone color is tan.

Additional human remains: None. **Dental Pathology:** **Cranial Pathology:**

Skeletal Pathology: None noted. **Noteworthy Features:**

Comments: Consistent with Pietrusewsky Skeleton #42. Midshaft femur measurements (AP 26 mm and transverse 26 mm) are consistent with either male or female sex.

Burial Number: 1966 - 71: Middle Period 5??, square G4. Burial not lifted.

Burial Number: 1966 - 72

Archaeological Context: Middle Period 3?, square F4 east quadrant and square F4/E4, AD 150 cm, orientation SE. Body flexed with knees to the right. Body from elbows up in F4 east baulk and not excavated. Four vessels beyond legs and two vessels to the right of the chest.

Age: 45 - 50 years (auricular surface morphology).

Sex: Male (*os coxae* and infracranial bone morphology).

Stature: 167.9 ± 4.0 cm (5' 6") [left femur].

Completeness: Partial infracranial skeleton. Missing are the clavicles, scapula, sternum, manubrium, left humerus, some left carpals, distal hand phalanges, portion of the right distal femoral shaft, right patella, right calcaneus and two cuneiforms, left navicular and one cuneiform, cervical and upper thoracic vertebrae, pubic rami, all ribs, sacrum and right fibula.

Preservation: Good. The long limb bones were restored from large fragments. There are insufficient fragments for the missing portions of the lower body. There is significant weathering of the *os coxae*, foot and vertebral elements. Concretions have not been removed from the left foot. Bone color is tan with black mottling and hardened grey concretions. The bone has a porcelain ring.

Additional human remains: Proximal left second metacarpal, ?ulnar shaft fragment.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Dorsal extensions of the distal articular facets of the first metatarsals, right larger than left, occur on the lateral side. On the right side there is a mounded drift of bone around the extension. The left calcaneus has an enlarged medial tubercle, which is expanded medially but not extended anteriorly.

Noteworthy Features: The right navicular is present and complete. There is an extension of the navicular tuberosity which has a rounded flattened "facet" at the end, suggesting the possibility of an accessory ossicle (which has not been recovered).

Comments: Consistent with Pietrusewsky Skeleton #25 except the vertebrae are now missing. Aging: Auricular surface VI 45-49. Radiographs: left femur, left tibia, left radius. Photographs: right navicular and first metatarsal.

Burial Number: 1966 - 73

Archaeological Context: Middle Period 5??, square E6 and D6/E6, AD 125 cm, orientation W-NW. Body supine, right hand under pelvis (left hand unexcavated). Bone fragile and incompletely lifted. Two pots probably beyond head, one other to the right of hip; sherd sheet lying under lower legs.

Age:

Sex:

Stature:

Completeness:

Preservation:

Additional human remains:

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments: Remains not located in 1993. Pietrusewsky Skeleton #28 is described as "cranial fragments. Fragments of upper and lower limb bones too incomplete to permit recording of either measurements or morphology" (1974:36).

Burial Number: 1966 - 74

Archaeological Context: Middle Period 3, square E4/F4, AD 170 cm, orientation SW. Body apparently supine but so badly disturbed as to make this uncertain. Skeleton from lower chest down removed by disturbance. A polished tubular stone bead placed next to the skull and a small vessel lay beyond it.

Age: 8 - 10 years (dental eruption).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Partial skull and infracranial skeleton. The skull is represented by the mandible missing the left coronoid process, the right temporal, basiocciput, and portions of the right frontal and parietals. A single hyoid horn was also identified. From the infracranial remains are the clavicles, scapulae at glenoid, all of the cervical and thoracic vertebrae, and most ribs.

Preservation: Good - Fair. The cranial vault was reconstructed but not completely restored. There are insufficient fragments to complete the reconstruction. The vertebrae are well preserved with preservation of the foramina transversaria and most arches and slight weathering of the bodies. The ribs are fragmented and no attempt at reconstruction was made. Clavicles and some of the ribs are light tan in color while the remainder of the bones are brown with some darker splotches. The bones have a porcelain ring.

Additional human remains: A second skull is labelled "Burial XX from E4/E5."

Dental Pathology: Wear of the deciduous molars exposes the dentin and there is enamel polishing of the erupted permanent first molars. The unerupted permanent second molars are whitish in color. There is a brown stain on all exposed teeth. Interproximal caries on the deciduous right maxillary canine and the first molar.

Cranial Pathology: Coarse porosis is present on the basiocciput, anterior to the condyles. The pits are small, smooth-walled, and perforate the cortex. Cranial vault thickness measurements range from 7 - 9 mm. The fragments of the cranial vault associated with Burial 74 are small in size but fusion of the sutures is advanced (possibly intrusive). The fragment includes a portion of the frontal at the right coronal suture, the parietal at this articulation and posterior to the sagittal and lambdoidal sutures at the lambda. The right coronal suture has substantial fusion at the pterion, and lambdoidal wormian bones are also nearly obliterated at the posterior sutures. If the vault fragments are not intrusive then premature fusion of all cranial vault sutures is present.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: The wooden box was labelled "E4/[couldn't read] Burial XX Bone Group M". The description of the infracranial remains matches Burial 74 in square E4/F4. The first cervical vertebra fits the occipital condyles. Consistent with Pietrusewsky Skeleton #75. Not positive of vault fragment association as sutures are beginning to fuse.

Burial Number: 1966 - 75

Archaeological Context: Middle Period 7??, square E5, south quadrant, AD 115 cm, orientation NW. Only a small portion of the burial extended into the excavation area. Bones in poor condition, not entirely lifted.

Age: Adult (size and epiphyseal fusion).

Sex: ?Male (size of the medial epicondyle of the humerus).

Stature: Cannot be determined.

Completeness: Few infracranial bone fragments. Present are eight rib body fragments, three vertebral body fragments, four thoracic arch fragments, distal left humerus (medial epicondyle), distal humeral shaft fragment, a left lateral patella fragment, and other unidentified bone fragments.

Preservation: Poor. Incomplete and fragmentary. No reconstruction possible. The bone is soft and crumbly, with both new and old breakage. Bone color is tan. There is no porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #39, but change in sex estimate. Distal humeral circumference (62 mm) consistent with either sex. No data collected.

Burial Number: 1966 - 76: Found to be part of Burial 8 Mound.

Burial Number: 1966 - 77

Archaeological Context: Middle Period 2, square D5 and D5/C5, AD 150 cm, orientation N-NW. Mound. Body supine with hands apparently under pelvis, bones of the trunk and arm jumbled. Skull apparently propped on organic material. Pot at the top of head, a *sus* forelimb, smashed vessel over feet. Extensive mound with animal bones and hand bones of an adult (PS #56)

Age: 40 - 45 years (auricular surface and pubic symphysis morphology; cranial suture fusion).

Sex: Male (cranial and infracranial morphology).

Stature: 163.1 ± 4.0 cm (5' 4½") [left femur].

Completeness: Substantially complete skull and infracranial skeleton. The skull is missing portions of the maxilla, zygomatic processes, some of the occipital, a maxillary tooth, and the mandibular left condyle. The infracranial remains are missing the proximal left clavicle, scapular bodies and processes, some tarsals, hand and foot phalanges, most vertebrae, and sternal rib ends.

Preservation: Good. The cranial vault is reconstructed from large fragments with good result except for the face; the maxilla was attached but is no longer. The mandible is well preserved. Cleaning marks on the cranium. Reconstruction of the long limb bones to complete length. The vertebrae required partial reconstruction but insufficient fragments are present to complete restoration. No reconstruction of the ribs. Some compression damage to the femoral condyles and weathering of the epiphyses. Bone is mottled tan-white and brown-black, hard textured, and has a porcelain ring.

Additional human remains: Coronoid process of an adult.

Dental Pathology: Small occlusal pit caries on the mandibular right second molar. Moderate calculus on the teeth of both jaws. Slight rolled rim of the lower posterior tooth sockets. Wear exposes the dentin in the first molars. The enamel of the teeth is of two different qualities with a discrete division. Measurements show a range of age at occurrence: maxillary incisors at 3 years, molars 6.5-7.0 years, and mandibular canines and premolar 4.5-5.0 years. A reddish-brown stain on the occlusal and crown surfaces of the teeth. The maxillary central incisors and the left mandibular incisors are stained a blue-green. On the maxillary central incisors the stain appears on the lower half of the crown and is darker on the labial surface. This region may have been covered by calculus in the living person. In the mandibular incisors, blue stain occurs on the labial surface from the occlusal surface to the mid-crown.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 9 mm. There is a healed coarse porosis of the posterior vault and healed cribra orbitalia.

Skeletal Pathology: Slight osteoarthritis of the feet and hips.

Noteworthy Features: Well marked anterior proximal femora and humeri. Ankle squatting facets.

Comments: The wooden box of infracranial remains was labelled "Burial 37A C5 + D5" but no such burial was excavated. Measurements match Pietrusewsky Skeleton #18, supported by a photograph of the skull (1974:134). The hand bones from the mound (PS #56) were not found. The skull box was labelled "Burial 77" but contained three different skulls. Aging: Pubic symphysis McKern $\sum$14 35.8±3.89, Todd VIII 39-44, Suchey IV-V 38.2-48.1±14.6; Auricular surface VI 45-49; Cranial suture closure post. $\sum$=6 =34.7±7.8, ant. $\sum$=4 =41.1±10.0. Photographs: dental staining, calculus, attrition, caries, wear. Radiographs: vault, humeri, right radius and ulna, femora, tibiae, fibulae.

Burial Number: 77I

Archaeological Context: In skull box labelled "Burial 77".

Age: Adult (infracranial bone size).

Sex: ?Male (size infracranial bone size).

Stature:

Completeness: Partial cranium. Complete left parietal, a fragment of the frontal at the left coronal suture, and two small vault fragments.

Preservation: Good. The parietal was reconstructed with some distortion of the lower edge. There are fresh breaks of the frontal, but no fragments are present. Bone color is brown and solid, texture is smooth. There is some flaking of the outer layer of cortex.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 7 - 10 mm. The thickest measurement is at the mid-frontal with expansion of the diploe. There is no external porosis.

Skeletal Pathology:

Noteworthy Features:

Comments: Unknown provenience. Doesn't match Burials 30, 68, or 80. Pietrusewsky does not have intrusive remains with Burial 77. Photographs: frontal thickening.

Burial Number: 1966 - 78

Archaeological Context: Middle Period 4??, square G4 west quadrant and square F4/G4, AD 110 cm, orientation SW. Body supine, legs flexed to the right (slightly), upper portion in west baulk and not excavated. Skull over knees apparently belongs to this person but not certain. Single pot plus bovine leg bones placed over legs.

Age: 45 - 50 years (auricular surface and pubic symphysis morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 166.7 ± 7.8 cm (5' 5½") [segment left femur].

Completeness: Skull fragments and partial infracranial skeleton. The skull includes the right maxilla, frontal, mastoid, vault fragments, and central mandible. The infracranial remains include the proximal right radius and ulna, *os coxae*, three left metacarpals, right femoral head, left proximal femur, right femoral shaft, fibular fragment, sacrum, thoracic vertebrae missing the third, lumbar vertebrae, and sternal fragments.

Preservation: Fair. Incomplete and fragmentary. Some reconstruction of the skull. The tooth crowns are missing, broken off at the roots. The vertebrae are fairly well preserved. Some of the breakage is fresh. Bone color is light tan and bone has a porcelain ring.

Additional human remains: Left tibial midshaft fragment, femoral shaft fragments, and fibular shaft fragments are intrusive and could not be assigned to another burial.

Dental Pathology: Wear on the maxillary second molar is slight. Wear on the mandibular teeth exposes the dentin. Abscess at the apex of the mandibular left lateral incisor.

Cranial Pathology: Two cranial vault thickness measurements, frontal 7 mm and bregma 6 mm.

Skeletal Pathology: Slight osteoarthritis of the right elbow articular surfaces.

Noteworthy Features: Sacralization of the fifth lumbar vertebra. Possible fusion of the fourth lumbar vertebra to the right superior lamina and facet of the fifth lumbar vertebra. Very robust individual with well marked femora.

Comments: The third lumbar arch present here glued to the lumbar body in the intrusive spine of Burial 59, although the fit of the fourth and fifth lumbar vertebrae is not perfect, the spine is assigned here. Inconsistent with archaeology but consistent with Pietrusewsky Skeleton #27. Aging: Pubic symphysis McKern $\Sigma 15$ 41.0±6.22, Todd IX 45-50, Suchey V 45.6±10.4; Auricular surface VI 45-49; Cranial suture closure post. $\Sigma \geq 2$ ≥30.5±9.6, ant. $\Sigma \geq 1$ ≥32.0±8.3. Photographs: mandibular teeth, sacrum, pubic symphysis

Burial Number: 1966 - 79

Archaeological Context: Early Period 3? Middle Period 1?, square C5, east quadrant, AD 155 cm, orientation N-NW. Body apparently supine, fragments of skull and upper chest remain after extreme disturbance. String of shell beads and a cowrie shell placed around neck. Burial appears to have been disturbed Mound 80 shortly after the latter was made.

Age: 3 - 4 years (dental eruption and formation).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and upper infracranial skeleton. Present from the skull are the mandible missing the bilateral posterior body and ramus, and the anterior deciduous teeth; the right maxilla missing the anterior deciduous teeth, the left deciduous canine and first molar; and the zygomas. The infracranial remains include small fragments of the ribs, a distal humeral shaft fragment, and a clavicular fragment.

Preservation: Poor. Very fragmentary and incomplete. There are insufficient bone fragments present for restoration. There is a grayish mud covering all elements and concretions which fill the tooth sockets and have fused some rib fragments together. Very few observations could be made. The bone is stained black and smooth to the touch, and has a porcelain ring.

Additional human remains: None.

Dental Pathology: The deciduous teeth exhibit polishing of the enamel only. The mandibular left canine has a small circular area of hypoplastic enamel on the mesial surface of the labial crown (possible localized hypoplasia of the primary canine). There is black staining on the tips of the cusps and brown staining on the labial and buccal surfaces. The permanent molar crowns are stained black.

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Consistent with Pietrusewsky Skeleton #70. Photographs: dental staining on the mandible and maxilla.

Burial Number: 1966 - Mound 80

Archaeological Context: Early Period 3?, Middle Period 1?, square C5 and C5/C4, north quadrant, AD 90 - 115 cm, oval orientation. Main burial not found but maybe marked by pot at 155 cm. A few fragments of pelvis and long limb bone were found in the mound.

Age: 45 - 50 years (auricular surface morphology).

Sex: Male (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Skull and infracranial fragments. A fragment of the occipital from asterion to asterion and including the inion and opisthion, and a small part of the left inferior posterior parietal are present from the cranium. Infracranial remains include the left proximal femur with a head fragment, and fragments of the *os coxae*.

Preservation: Fair. Although intact, the bones exhibit weathering, old broken surfaces, and a grey mud film which is not removed by water. All breakage is old and there is some encrustation. Bone color is mottled tan/black. The cranial bones has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Very thick, robust occipital fragment but it appears muscular rather than pathological. Thickness measurements at the asterion are 10 and 12 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: In skull box labelled "Burial 80 very thick skull with note". This material is consistent with Pietrusewsky Skeleton #9, except that there is no mention of cranial material. A small piece of paper says "NP7 Baulk C6/C5 bones pottery from material lying on 17 surface to the right of leg protruding into mound of chup(?) Burial 30/3/66 see Notebook X 30/3/66 pp 3." This provenience is not consistent with Burial 80. Aging: Auricular surface VI 45-49.

Burial Number: 1966 - 81

Archaeological Context: Early Period 3?, square C4/D4 and C4 east quadrant, AD 205 cm, orientation NW. Body supine but bones disarticulated and only in approximate location. Apparently a secondary burial. A pot placed beyond head, a pot squashed in bottom of grave, a single shell disc bead which is probably an accidental inclusion.

Age: 50 - 60 years (auricular surface morphology and osteoarthritis).

Sex: Male (infracranial and *os coxae* morphology).

Stature: 165.6 ± . cm (5' 5¼") [left ulna].

Completeness: Partial infracranial skeleton. Missing are the clavicles, scapular bodies, proximal humeri, distal radii, ends of the right ulna, most carpals and some metacarpals, pubic symphyses, iliac blades, most of the tibiae except the plateau fragments; fibulae, tali, left calcaneus, most other tarsals and metatarsals, some thoracic vertebral bodies, the upper lumbar vertebrae, lower sacrum, and the sternal rib ends.

Preservation: Fair - Poor. The left ulna is reconstructed to its complete length. All other bones required reconstruction but none could be completed. The hand and foot bones, ribs and vertebrae are poorly preserved with concretions and weathering. The right forearm bones are crushed. Cleaning marks are present on the femoral shafts. Bone is very soft and fragile. The bone color is tan with intermittent mottling of black. Some bones have a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the hand bones, especially the right first metacarpal and trapezium. Moderate to marked osteoarthritis and osteoporosis of the vertebrae including the ?sixth cervical body and the lower lumbar bodies. The ?sixth cervical vertebra has coarse macroporosity of the posterior edge of the superior end-plate. The inferior end-plate has two areas on the lateral margins where trabecular bone is exposed without evidence of reactive bone formation (? postdepositional). Radiograph demonstrate the defects without evidence of sclerosis and with a coarse appearance. The right superior facet of the first thoracic vertebra is "rolled" along the inferior margin, extending more inferiorly than the left side. As well, the left inferior facet is much larger and extends more inferiorly than the right, perhaps compensating for the asymmetry above. The second thoracic vertebrae has corresponding changes to the superior facets, the left is enlarged and extended superiorly. The lumbar vertebrae are poorly preserved but fragments exhibit marked lipping and porosis of the centra with rugged topography of the end-plate because of bone loss. Jagged osteophytosis on the rims.

Noteworthy Features: The right femur is bowed anteriorly with the *linea aspera* pulled backward almost into a spine rather than a square. Well marked deltoid tubercle. A single cervical vertebral arch fragment has an unusual foramen which perforates the posterior right lamina below the superior facet.

Comments: Consistent with Pietrusewsky Skeleton #47. Aging: Auricular surface VII 50-59. Photographs: The sixth cervical vertebral body, the first and second thoracic vertebral facets, lumbar vertebral bodies. Radiographs: sixth cervical vertebral body, left ulna.

Burial Number: 1966 - Mound 82: No skeletal remains recovered.

Burial Number: 1966 - 83

Archaeological Context: Middle Period 1-2? or Early Period 3??, square D4 and C4/D4, AD 175-90 cm, orientation round. Only the right humerus and right femur recovered. Remainder of burial apparently removed by Burial 82.

Age: 9 - 12 months (diaphyseal measurement).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Two long limb bone diaphyses. The right humeral diaphysis and the left femoral diaphysis missing the distal end are present.

Preservation: Good. The humeral diaphysis is intact, and there is old breakage of the distal femoral diaphysis. There is some weathering of the extremities of both bones. Bone color is brown, texture is smooth. The bone has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: In 1993 these remains were found intrusive in Burial 59. Consistent with Pietrusewsky Skeleton #2. Radiographs: left humerus.

Burial Number: 1966 - 84

Archaeological Context: Early Period?, Middle Period 1-2?, square D4/D5, north quadrant, AD 180 cm, orientation SW. Fragments of a skull and long bones recovered, part of a burial complex which includes Burials 64, 82, 83 and 87. Three shell disc beads recovered.

Age: 12 - 18 months (dental eruption).

Sex: ?Female (dental measurements).

Stature: Cannot be determined.

Completeness: Fragments of the skull and infracranial skeleton. Present from the skull are the anterior mandibular body with few deciduous teeth, left maxilla, anterior right zygoma, left occipital condyle, and fragments of the frontal and parietals. Three fragments of long bone shafts (?leg bones).

Preservation: Poor. Crushed and fragmentary. There are insufficient fragments present to restore the skeleton. Concretions are heavy on the long limb bone shafts, and portions of the vault have fused together with ribs. A portion of the frontal is best preserved. Other clumps of bone and concretions are not recognizable. No measurements could be made because of concretions. Bone color is tan with grey and light black mottling of some fragments.

Additional human remains: A left calcaneus, complete but weathered, and a left fibular midshaft fragment (about 200 mm in length) assigned to Burial 67.

Dental Pathology: Small semi-circular area of hypoplasia in the mesial surface of the labial crown of the right mandibular deciduous canine, probable localized hypoplasia of the primary canine (LHPC).

Cranial Pathology: The small reconstructed fragment of the frontal, along the frontal crest from the naso-frontal suture to the midpoint, has slight thickening of the diplöe on the left side but not the right. The thickening is visible in cross section at the upper edge of the broken fragment. The metopic suture has fused with a small ridge remaining on the external vault.

Skeletal Pathology: None noted. **Noteworthy Features:**

Comments: Consistent with Pietrusewsky Skeleton #89. Photographs: dental eruption, hypoplasia, frontal thickening.

Burial Number: 1966 - 85: Skull apparently lifted but not examined by Pietrusewsky and could not be identified in 1993.

Burial Number: 1966 - 86: Same as Burial 90.

Burial Number: 1966 - 87: Assigned as a portion of the complex containing Burials 64, 82, 83 and 84 but probably does not represent a discrete burial. No remains examined by Pietrusewsky and none identified in 1993.

Burial Number: 1966 - 88

Archaeological Context: Middle Period I??, square D4, southeast quadrant, AD 105 cm, orientation N-NE. Consisted of long bones only, laid with feet to the S-SW ; skull placed to east of thighs, facing north. Dug into top of Burial 26 but not associated with it. Probably a secondary burial. Two associated pottery vessels.

Age: 50 - 60 years (auricular surface, pubic symphysis and cranial suture fusion).

Sex: Male (cranial and infracranial morphology).

Stature: 167.1 ± 7.3 cm (5' 5¾") [segment left femur].

Completeness: Partial skull and infracranial skeleton. The skull is missing the maxilla except a few teeth, nasal processes, left zygoma, sphenoid body, occipital condyle, and the right and anterior basi-occiput. Present from the infracranial skeleton are the bilateral ulnar and radial shafts, some carpals, seven metacarpals missing the distal ends, six phalanges, patellae, femora missing distal ends, bilateral fibular and tibial shafts, right foot missing one metatarsal; left talus, navicular and two metatarsals; two rib fragments, three vertebrae, sacrum, left *os pubis*, and right auricular surface.

Preservation: Good - Fair. The mandible is well preserved. The cranial vault was reconstructed with some distortion at the bregma and coronal sutures, and incomplete restoration of the basiocciput. The long bones required minimal reconstruction, there are few fragments available. Most bones have weathering of the cancellous portions, and old and new breakage. A thin coating of dirt which doesn't brush off is present on the symphysis pubis and skull bones.. The right foot bones are lightly colored while the rest of the skeleton is tan to yellow-brown, with a coarse texture and slight porcelain ring.

Additional human remains: Long bones of a ?male adult: left femoral shaft, right femoral midshaft fragment, and a left rib body fragment (Burial 88A). Long bones of an ?sex adult: femoral shaft fragments, left tibial shaft, and other small bone fragments (?fibula) [Burial 88B].

Dental Pathology: Premortem loss of the right mandibular incisors and molars. There has been migration of the mandibular canines anteriorly suggesting loss of the incisors well before death. The alveolar bone is healed, but there is a tiny "socket" visible at the left lateral incisor. Huge occlusal caries on the mandibular left second molar, and interproximal caries on the right maxillary premolars. Abscessing of the mandibular left first molar socket. Dental wear exposes the dentin in most teeth, and the pulp in the premolars. Slight to moderate resorption and slight rolled rim of the left mandibular posterior sockets. The left third molar is elevated above the occlusal plane, suggesting that it was unopposed in life.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 7 mm. No porosis or cribra orbitalia noted. Tympanic thickening with small auditory meati. The mandible is very large, with a high ramus and square chin. At the mandibular third molar, the alveolus is formed into a torus-like expansion.

Skeletal Pathology: Slight to moderate osteoarthritis of the appendicular skeleton, especially the hands, right hip and ankles. There is evidence of osteophytosis of a single vertebral centrum fragment as well as moderate osteoarthritis of the inferior acetabulum. There is a laterally spurred exostosis of the left tibia just above the midshaft, along the interosseous border. The cortical bone is smoothly graded into the exostosis which measures 23 mm in length and is 9 mm off the cortex. No spurring is evident on the fibula. Radiograph of the tibial shaft documents the presence of an ossified syndesmoses made up of dense cortical bone consistent with the surrounding cortex. The left first metatarsal has a proximal extension of the distal articular facet. The right ischial tuberosity appears flattened into an oval shape, on the posterior-lateral edge.

Noteworthy Features: Tympanic thickening and mandibular torus. This is a very robust individual.

Comments: Consistent with Pietrusewsky Skeleton #67. Aging: Pubic symphysis McKern $\Sigma 15$ 41.0±6.22, Todd X 50+, Suchey VI 60.0±12.4; Auricular surface VII 50-60; Cranial suture closure post. $\Sigma \geq 15$ ≥45.2±12.6, ant. $\Sigma \geq 4$ ≥41.1±10.0. Photographs: mandible, tympanic thickening, tooth wear, resorption, caries patellae, distal phalanges, first metatarsal, tibia. Radiographs: left tibia, cranium.

Burial Number: 1966 - 89: Part of Mound 25.

Burial Number: 1966 - 90

Archaeological Context: Middle Period 4??, square F4 and F3/F4, east quadrant, AD 130 cm, orientation S-SW. Only ankles and feet of the burial extended into the excavation area, plus four vessels apparently beyond and to the right side of the feet. Material originally assigned to "Burial 86" as well as one vessel are probably part of this burial. Disturbed by Burial 31.

Age: Adult (size and epiphyseal fusion). **Sex:** ?Male (infracranial bone size).

Stature: 163.8 ± 9.1 cm (5' 4½") [segment right tibia].

Completeness: Partial distal lower legs. Present are the distal ends of the tibiae, distal ends of the fibulae, left distal fibulae shaft fragment, tali, calcaneal fragments, cuboids, naviculare, first metatarsals, left second metatarsal, right second through fifth metatarsals missing distal ends, and a fragment of the left humeral shaft at the deltoid tuberosity.

Preservation: Fair. What is present is well preserved, strong cortical bone. No reconstruction was possible. The tibiae are freshly cut straight across. The calcanea are weathered and there are cleaning marks on all bones. Bone color is light tan with little mottling.

Additional human remains: None

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the foot bones.

Noteworthy Features: Dorsal extension of the articular facet of the head of the first metatarsals.

Comments: Wooden storage box was labelled "Burial 86". Consistent with Pietrusewsky Skeletons #73 and #74.

Burial Number: C

Archaeological Context: Remains identified in 1993 with no known provenience.

Age: Adult (size and epiphyseal fusion).

Sex: ?Male (infracranial bone morphology).

Stature: 171.5 ± . cm (5' 7½") [segment right humerus].

Completeness: Fragmentary infracranial skeleton. Present are the left distal radius, right proximal ulna, right humerus with head fragment, right glenoid, left second metacarpal, the left distal tibia, right distal fibula, and left proximal femoral shaft missing the head.

Preservation: Fair. The remains are incomplete and fragmentary. Some reconstruction of the humerus and femur was done previously - no further reconstruction possible. Few other bone fragments. Bone color appears quite uniform, mottled grey and white. The bone is hard and smooth to the touch with a porcelain ring.

Intrusive Human Remains: None

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: The wooden storage box was in the position of Burial 83, but Burials 83 and 84 are children. Burial 82 had no recovered skeletal remains. Labelled "C" by the author. The coloring and size suggest the skeletal elements go together as a single individual.

NON NOK THA 1968 BURIAL DESCRIPTIONS

The provenience information for the 1968 excavation series is summarized below:

Archaeological Context: Brief summary of provenience data, portion of the burial recovered by the excavators, associated artifacts, as well as *in situ* measurements of individual bones if made. Provenience information includes:

Period: Assigned by Bayard (1971). A ? indicates a doubtful assignment.
Level: Archaeological level assigned by Bayard (1971).
Excavation square: A number and letter designation (e.g. square 4H).
Quadrant: The quadrant of the square (e.g. northwest quadrant).
AD: Absolute Depth below surface.
Orientation: Directional orientation of the head of the burial (abbreviated by capital letters).

Burial Number: 1968 - 1

Archaeological context: Middle Period 6, level VII, square 4H, middle of square, AD 65 cm, orientation WSW. Supine adult burial twisted to the left. The skull is crushed and the right ribs were not articulated.. There is a pot beside the head and a stone over the left elbow, a bronze bracelet on the right forearm, and a socketed bronze "halberd" with a thin wide blade at the upper right chest.

Age: 45 - 50 years (auricular surface).

Sex: Male (cranial and *os coxae* morphology).

Stature: Cannot be determined.

Completeness: Partial skull and infracranial skeleton. The skull is represented by the major bones of the vault, the left mandibular condyle and body, a right maxillary fragment and loose teeth. The infracranial remains include the clavicular shafts, fragments of the scapulae, left humerus missing the proximal end, right distal humerus, radii and ulnae missing the distal ends, *os coxae* fragments including bilateral auricular surfaces, femoral heads, left femoral shaft fragments, and a few rib and vertebral arch fragments.

Preservation: Fair. The cranium is incomplete and fragmented. Reconstruction of the frontal and parietals at the sagittal and coronoid sutures. There is substantial weathering of the occipital fragments. The dental sockets are filled with hardened soil so few teeth could be replaced in their sockets. Hardened mud inhibits observations of dental hypoplasia. Some reconstruction of the long limb bones was required but none could be completely restored because of insufficient fragments. There is a circumferential greenish stain on the right forearm bones.

Additional human remains: Possible that a mandibular canine is intrusive.

Dental Pathology: Premortem loss of the mandibular left molars. Wear exposes the pulp in the premolars of both jaws. Slight to moderate alveolar resorption.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 8 mm.

Skeletal Pathology: The left humerus has an enlarged deltoid tuberosity which measures 20 mm in length and 21 mm in breadth, composed of cortical bone. The opposite side is not available for observation.

Noteworthy Features:

Comments: Aging: Auricular surface VI 45-49; Cranial suture closure post. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: green stains of forearm bones.

Burial Number: 1968 - 2

Archaeological context: Middle Period 6?, level VII, square 4D, center of square, AD 95 cm. Child burial with only the skull and upper body present in the excavated area. Three pots located beyond head, with a bronze fragment near the left hand and three pots in the fill.

Age: 5 - 6 years (radial diaphyseal length).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial upper infracranial skeleton. The skull is represented by fragments of the vault including the temporal, basiocciput, frontal and parietals; the right mandibular body and left maxilla with mixed dentition. Present from the infracranial skeleton are the clavicles, left scapula at the glenoid, left humeral head epiphysis, left humeral diaphysis, fragments of the right humeral diaphysis, radial diaphyses, proximal ulnar diaphyses, some ribs from both sides, fragments of the arches of the cervical and upper thoracic vertebrae, and some unidentified fragments.

Preservation: Poor - Fair. The skull is poorly preserved and no reconstruction attempted. Complete long limb diaphyses but the ribs and vertebrae are fragmentary. The maxillary teeth are stained a blue-black color which is likely post-depositional. The bone color is mottled grey, black and tan with coarse texture. A grey mud adheres to all surfaces. The bone does not have a porcelain ring.

Additional human remains: None.

Dental Pathology: The dentin is exposed in the deciduous canines and molars of the right maxilla and left mandible. The right deciduous mandibular canine has two oval-shaped defects of the labial enamel, one near the top of the mesial surface and the other at the mid-crown . Under magnification, hypoplasia of the enamel is visible, with a decrease in thickness at these points. These defects are probably localized hypoplasia of the primary canine (LHPC).

Cranial Pathology: Maximum vault thickness is 5 mm.

Skeletal Pathology: None noted.

Noteworthy Features: Tympanic thickening, marked incisor shoveling.

Comments: Radiographs: radii.

Burial Number: 1968 - 3

Archaeological context: Middle Period 4?, level V, square 4H, east quadrant and middle of square, AD 105 cm, orientation SW?. Skull only in excavated area. Body apparently supine with two pots beyond head, clamshell beneath.

Age: 45 - 50 years (cranial suture fusion).

Sex: Male (cranial morphology).

Stature: Cannot be determined.

Completeness: Incomplete cranium. Present are the frontal missing the left supraorbital region, right parietal missing the sagittal suture, right temporal, right occipital, basiocciput, sphenoid body, and the maxilla missing the nasal processes and the right molars.

Preservation: Fair. Breakage appears old. Some fragments required repeat reconstruction. There is some warping of the right parietal. The left second molar is cracked in half post-depositionally. The bone color is mottled tan, black and brown. The texture is coarse.

Additional human remains: None.

Dental Pathology: Moderate calculus on all teeth. Slight alveolar resorption. Dental wear exposes the dentin in the anterior teeth and the cusps are worn flat in the molars but dentin is not yet exposed. The left maxillary third molar has a square-shaped defect of the middle of the buccal crown. The defect is expansive and the edges appear sharp. Difficult to asses whether it is postmortem damage or caries, not counted as a caries.

Cranial Pathology: Crania vault thickness measurements range from 5 - 8 mm. No apparent thickening and no porosis of the external vault.

Skeletal Pathology:

Noteworthy Features: Moderate shovel-shaped central incisors.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 12$ $\geq 45.2 \pm 12.6$, ant. $\Sigma \geq 10$ $\geq 51.9 \pm 12.5$.

Burial Number: 1968 - 4

Archaeological context: Early Period 1, level I, square 2F, south and west quadrants, AD 180 cm, orientation NW. Supine adolescent burial with all but the feet and right arm present. The legs slightly flexed to the right and the trunk disturbed. The ribs and vertebrae are mingled. Five pots were located near the head and one pot at the left side.

Age: 40 - 45 years (auricular surface and dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: Cannot be determined.

Completeness: Substantially complete skull and moderately complete infracranial skeleton. The skull is missing the left mandibular condyle and anterior teeth, the maxillary left incisors and central maxilla, nasal bones, portions of the sphenoid body and inferior basiocciput, and the left inferior parietal. Infracranial remains are missing most of the ribs, cervical vertebrae three through five, ends of the clavicles, left scapula, ends of the ulnae, proximal right radius, most hand and foot bones, pubic symphyses, and the ends of the tibiae and fibulae.

Preservation: Good - Fair. The skull is fairly well preserved and the vault was previously reconstructed. Neither the face or the basiocciput could be restored. The teeth have broken off at the roots and are lost. There is no complete long limb bone. The first and second cervical vertebrae are complete but other vertebral bodies and arches are weathered with exfoliating cortical bone and some parts are fused together with concretions. Hard concretions adhere to all bones. Bone color is light tan.

Additional human remains: A left tibial midshaft with light orange brown coloring.

Dental Pathology: Slight alveolar resorption. Slight to moderate calculus on the maxillary teeth. Possible premortem loss of the mandibular central incisors. Wear has flattened the cusps and exposed the dentin in all teeth. There is slight non-linear pitting hypoplasia of the right mandibular canine.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 9 mm.

Skeletal Pathology: Slight osteoarthritis of the vertebral facets and osteophytosis of the vertebral rims in the lumbar and upper thoracic region. The left lamina of the ?seventh cervical vertebra has a healed fracture, with resulting thickening of the pedicle and deformation of the superior facet. There is no evidence of reactive bone formation. The second or third thoracic vertebra has extensive osteophytosis of the superior end-plate, extending superiorly, which may be related to the trauma occurring above, as there is little or no osteophytosis of the other vertebrae present. In addition, there is a small rib fragment which exhibits a blunted, fractured end and the distal fragment has fused a short distance from the end.

Noteworthy Features: Maxillary third premolars are rotated 45 degrees posteriorly. The left third molar is unerupted.

Comments: Aging: Auricular surface IV-V 35-45; Cranial suture closure post. $\Sigma \geq 7$ $\geq 39.4 \pm 9.1$, ant. $\Sigma \geq 3$ $\geq 41.1 \pm 10.0$. Photographs: mandible, sixth cervical and third thoracic vertebrae, rib fragment. Radiographs: mandible, third molar.

Burial Number: 1968 - 5

Archaeological context: Middle Period 4, level V, square 4G, south quadrant, AD 115 cm, orientation S-SW. Supine adult burial with only skull and neck in excavated area. Pots beyond head, bead and marine shell also found.

Age: 6 - 7 years (dental eruption and occipital synchondroses fusion).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Skull and fragments of the infracranial skeleton. The cranium is missing fragments of the central maxilla, sphenoid, and portions of the parietals and occipital. The mandible is missing the left coronoid process and condyle and some permanent and deciduous teeth. The infracranial remains consist of the left scapula at the glenoid, left lateral clavicle, few cervical vertebral arches, two thoracic vertebrae, and a few rib fragments.

Preservation: Fair. There are fresh and old breaks of the vault bones. The cranial vault bones were reconstructed but the face could not be restored. There are insufficient fragments present to complete restoration. Bone color is a dark mottled tan-black with an adherent film of grey-brown dirt.

Additional human remains: None.

Dental Pathology: Slight hypoplastic enamel, with secondary caries, of the deciduous right maxillary canine and right first molar. On the canine, a circular defect is present on the mesial labial crown surface, and a linear defect of the central buccal crown occurs on the molar. The buccal surfaces of the deciduous teeth are stained light brown. There is extreme wear (?post-depositional damage) of the left mandibular second deciduous molar, leaving only a small rim of crown; while the anterior teeth have only dentin exposure.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 5 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Photographs: mandible and tooth wear.

Burial Number: 1968 - 6: Grave cut detected but burial outside of excavation area.

Burial Number: 1968 - 7

Archaeological context: Middle Period 4, level V, square 4D, north quadrant, AD 110 cm, orientation W-SW. Supine burial with the pelvis and legs in the excavation area. Hands under pelvis, legs straight. The feet were disturbed by a later event. A stone adze over pelvis in area disturbed by later posthole. Pot at left of knees, two pots and pig bones beyond feet. Piece of bronze on top of grave over knees.

Age: 35 - 40 years (auricular surface and pubic symphysis morphology).

Sex: Male (*os coxae* and infracranial morphology).

Stature: 166.0 ± . cm (5' 5¼") [left radius].

Completeness: Partial infracranial skeleton. Present are the complete left radius, partial right hand, few metacarpals and phalanges of the left hand, right femur missing the distal end, left proximal femur and distal fragments, left patella, tibial shafts, right fibula missing the proximal end, left fibular midshaft fragment, right talus, and the *os coxae* missing the left pubic bone.

Preservation: Fair. The left radius and right fibula were reconstructed, but the femora could not be restored. All breakage is old. Weathering loss of some of the *os coxae* and patella. Bone color is mottled tan and black with a grayish soil in all cavities. Bone texture is coarse. There is a porcelain ring to most bones, especially those of the hands.

Additional human remains: A tibial diaphysis from an 8.5 - 9.5 lunar months fetus [Burial 7A].

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the acetabula, femoral heads, and metacarpals. The right first metacarpal head appears flattened and enlarged with a smooth-walled defect on the lateral margin. The bottom of the defect is smooth cortical bone and there is no evidence of reactive bone formation. The left first metacarpal is not available for comparison. Possible healed fracture of the distal right first metacarpal. There are marked entheses of all bones. The proximal right radius has an enlarged syndesmoses at the distal end of the proximal third.

Noteworthy Features: The left tibial shaft is noticeably bowed anteriorly. Poirier's facet is present on the femora. Talar squatting facet. Two slash or cut marks are noted on the superior surface of the right talus, both are small and short, one occurs on the anterior-lateral talar dome and the other on the anterior portion of the head, above the squatting facet. These marks are likely due to an earlier disturbance of the grave.

Comments: Aging: Pubic symphysis McKern Σ14 35.8±3.89, Todd VIII 39-44, Suchey IV 35.2±9.5; Auricular surface IV-V 35-44. Photographs: Poirier's facet, left patella, cutmarks on the talus, right first metacarpal. Radiographs: radius.

Burial Number: 1968 - 7A

Archaeological context: Sorted from Burial 7

Age: 8.5 - 9.5 lunar months fetus (diaphyseal length). **Sex:** Cannot be determined.
Stature: Cannot be determined. **Completeness:** Bilateral tibial diaphyses.

Preservation: Poor - Fair. Incomplete skeleton, but two bones present complete in length with some weathering of the ends.

Additional human remains:

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments:

Burial Number: 1968 - 8

Archaeological context: Early Period 1?, level I, square 2F, south and west quadrants, AD 185 cm, orientation S-SE. Child burial, only facial bones and part of upper body present. Appears to be in a prone position. Disturbed by Burial 4.

Age: 18 - 24 months (dental eruption). **Sex:** ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and a few infracranial remains. The skull includes the right ramus and body of the mandible, the left mandible, the left maxilla, left temporal, and a few fragments of the cranial vault. A few ribs and a long limb bone fragment are identified from the infracranial skeleton.

Preservation: Poor. The bones are fragile and fused with hard concretions. No reconstruction was possible. The mandible is the best preserved. Bone color is dark black-brown with light reddish tan soil adherent. The bones are set in the concrete-like stone.

Additional human remains: None.

Dental Pathology: There is a huge occlusal caries on the maxillary deciduous second molar which has destroyed the entire crown. There is light brown stain on the occlusal and buccal surfaces of the mandibular teeth, while the occlusal surface of the maxillary first molar is stained black. Dentin is exposed in most teeth.

Cranial Pathology: None noted. **Skeletal Pathology:**

Noteworthy Features: The mandibular left central incisor is winged,all other incisors are straight.

Comments: Rib and vertebral fragments (510 gm) submitted for dating by Brooks 6/72. Photographs: maxillary caries.

Burial Number: 1968 - 9

Archaeological context: Middle Period 4, level V, square G, middle quadrant, AD 110 cm, orientation SW?. Supine burial with only skull and left shoulder in the excavation area. Nest of pots, two clamshells, stone slabs and red pigment beyond head, sherd sheet, and sandstone on top of grave.

Age: 35 - 40 years (cranial suture fusion).

Sex: ?Male (cranial morphology and infracranial bone size).

Stature: Cannot be determined.

Completeness: Partial skull and fragmentary infracranial skeleton. Missing from the cranium are left lateral frontal at the supraorbital area, foramen magnum at opisthion, inferior parietals, left zygoma, superior maxilla, and sphenoid. The mandible is missing the right half. Present from the infracranial skeleton are the left scapula at the glenoid, left clavicle missing the distal end, first five cervical vertebrae, and a few rib fragments.

Preservation: Good. The cranial vault is reconstructed but the face could not be attached. The cervical vertebrae are well preserved. Reconstruction of the left scapula. There are no other bone fragments present. Breakage is both old and new. The bone color in the skull is a mottled orange-tan and black, while infracranial bones are light tan, mottled with black. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Gross occlusal caries on the maxillary left first molar. Moderate calculus on the posterior teeth and slight calculus on the anterior teeth. There is slight to moderate alveolar resorption. Dental wear exposes the dentin in all teeth and the pulp in the maxillary left canine. There is a semi-circular grooved "facet" on the buccal surface of the maxillary right third premolar. The dentin is exposed and is stained black. There is a slight polishing of the contiguous canine as well.

Cranial Pathology: Extreme cranial vault thickening, range 9 to 12 mm, with healed cranial vault porosis. There is a gradual and uniform increase in thickness beginning in the upper areas of the frontal, parietals and occipital with involvement of the sutures themselves. There is no reactive bone formation either endo- or ecto-cranially. Healed coarse porosis of the frontal with only small pits, which do not penetrate the outer cortex, remaining. Several deep Pacchionian pit-like defects of the endocranial surface are noted on the frontal on either side of the midline. The depressions are smooth-walled, with smooth trabeculae in the floor, and extend into the diplöe. The palate is porotic and raised along the anterior margin, and appears inflated and irregular.

Skeletal Pathology: The first five cervical vertebrae are in good condition, the first is incomplete, missing the left facet. The left superior facet of the second cervical vertebra has a rounded porotic lesion in the center of the facet (9 x 6 mm), and has several 0.5 mm perforations in the bottom. Viewing the vertebra from the posterior, it can be seen that this facet is depressed at its lateral margin, when compared to the right side. There is no evidence of reactive bone formation. The inferior left facet of the second cervical vertebra is also enlarged. Articulating the first three vertebrae reveals no curvature or torsion effect. The remaining vertebrae show no evidence of disease or disorder. Possible developmental defect or fracture of the left superior face of the second cervical vertebra.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 8$ $\geq 39.4 \pm 9.1$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. Photographs: second cervical vertebra, cranial vault thickening, mandibular caries and maxillary right third molar erosion. Radiographs: cranial vault.

Burial Number: 1968 - 10

Archaeological context: Early Period 3, level III, square 4, east and middle quadrants, AD 173 cm, orientation NW. Adult burial, extremely disarticulated with the bones of the lower leg removed by Burial 79. The skull is turned to the left, a bovine scapula and pot and a clay pellet are near the head, with some animal bones in the disturbed lower end which may belong to Burial 79.

Age: 30 - 35 years (cranial suture fusion, and auricular surface and pubic symphysis morphology).

Sex: Male (cranial, pelvic and infracranial morphology).

Stature: 163.9 ± 3.0 cm (5' 4½") [left femur].

Completeness: Complete skull and moderately complete infracranial skeleton. The cranium is missing the left zygomatic process, left tip of the mastoid, styloid processes, central and left lateral maxillary incisors and the left third molar. The mandible is missing the left coronoid process and the anterior tooth crowns. The infracranial remains are missing the spinal borders of the scapulae, right distal radius, sternal rib ends, first cervical vertebra, left pubic symphysis, right femoral head, anterior iliac blade, left patella, tibiae, fibulae, and feet except for the right second and third metatarsals.

Preservation: Excellent - Good. The cranium was preserved whole, with face attached. There is some warping of the posterior left zygoma, otherwise no distortion. The mandible is reconstructed at the midline and the right condyle with good result. Cranial bone color is mottled orange-tan and dark brown uniformly over both elements. Cranial bone texture is coarse with concretions. The infracranial remains are encrusted with a hard cement-like soil which is removed with difficulty. Reconstruction of all of the long limb bones was required. The vertebrae are intact with good preservation of the bodies but weathering of the lateral and spinous processes. The bone color is mottled tan and black with a coarse texture. All bones have a porcelain ring.

Additional human remains: A right mandible fragment, including the first and second molars and missing the gonion.

Dental Pathology: Possible abscessing of the left maxillary third molar and the right mandibular third molar, the teeth are not present but root sockets are still visible. Slight calculus is noted on some teeth but concretions obscure most observations. Slight rolled rim of the posterior mandibular alveoli. Dental attrition ranges from enamel wear in the posterior molars to dentin exposure. Wear of the maxillary first molars is asymmetrical. There are dark brown stains on the occlusal surface of the maxillary left three molars and the mandibular second molars.

Cranial Pathology: Thickness measurements of the posterior cranial vault range from 5 - 8 mm. There is evidence of a healed coarse porosis of the superior vault. The nasal bridge is flattened and widened and there is some alveolar prognathism.

Skeletal Pathology: Slight osteoarthritis of the appendicular and vertebral facets. The fourth lumbar vertebra is well preserved missing the right lateral process and with some weathering of the left inferior facet. There is moderate porosis of the anterior rim of the superior centrum, with loss of the normal height. Coarse, large (1 mm) porosity is present in the eroded area. The inferior end-plate of the third lumbar vertebra has slight porosis, but normal height and width. Possible reactive bone from an extruded disc.

Noteworthy Features: The right acetabulum is well preserved and at the anterior edge narrows down to a strip. This anomalous acetabulum is called "undeveloped". The bones appear gracile and long.

Comments: Note: Skull is in Bag "344S" which appears to read "NP 7; 4E; circle 8, Burial **101** Dr. 7 12-7-68. Personal communication with D. Bayard (1995) clarifies that this skull is Burial 10. Bayard (1970) states "may have been decomposed when buried". No cut marks noted. Aging: Pubic symphysis Gilbert $\Sigma 6$ 29.6±4.43, Todd V 27-30, Suchey II 25.0±4.96; Auricular surface II-III 25-34; Cranial suture closure post. $\Sigma=7$ =39.4±9.1, ant. $\Sigma=5$ =41.1±10.0. Photographs: skull, right acetabulum, right second metacarpal and fourth lumbar vertebra. Radiographs: cranium, right humerus, right radius, left ulna, left femur.

Burial Number: 1968 - 11

Archaeological context: Middle Period 6, level VII, square 4D, west quadrant, AD 112 cm, orientation SW?. Adult, only the feet protrude beyond the baulk. A sherd sheet found to the right of the feet.

Age: Adult (epiphyseal fusion and osteoarthritis).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Partial foot bones. Present are the right calcaneus, cuboid, third cuneiform, left navicular, bilateral first through the fifth metatarsals, the right proximal foot phalanges, and a middle hand phalanx.

Preservation: Good. No reconstruction was necessary. Grey-brown dirt adheres to all bones. There is weathering of the posterior calcaneus and the other tarsals. The bone color is mottled black and light tan, and bone texture is coarse. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the tarsal bones.

Noteworthy Features:

Comments:

Burial Number: 1968 - 12

Archaeological context: Early Period 3, level III, square 4, east quadrant, AD 160 cm, orientation NE. Infant with legs and part of the pelvis present; the body is supine with a pot and animal bone concentration to the west.

Age: 9 - 12 months (diaphyseal length, dental eruption).

Sex: ?Male (mandibular and iliac morphology).

Stature: Cannot be determined.

Completeness: Partial skull and partial lower infracranial skeleton. The skull includes fragments of the cranial vault, right mandibular body, right condyle and left body fragment, and the left temporal. From the infracranial skeleton, the right ilium, right femoral diaphysis, distal left femoral diaphysis, and tibial diaphyses are present.

Preservation: Poor. The cranial vault is completely fragmented with most of the teeth lost. No reconstruction was attempted. Bone color is mottled black and orange-tan with grey dirt adherent to all bones.

Additional human remains: Adult distal first metatarsal phalanx, left mandibular canine, a single middle foot phalanx.

Dental Pathology: None noted.

Cranial Pathology: Cranial vault thickness is 1 mm at the frontal eminence and 5 mm at the mid-frontal.

Skeletal Pathology: None noted.

Noteworthy Features: The unerupted mandibular right deciduous canine is stained dark brown on the base and has a white tip. Probable post-depositional staining due to incomplete mineralization.

Comments:

Burial Number: 1968 - 13: No burial in pit.

Burial Number: 1968 - 14

Archaeological context: Early Period 1, level I, square 4H, south and west quadrants, AD 165 cm, orientation E. Complete child burial, supine with two pots in the baulk beyond the head, a bovine? hindquarters and a carnivore skull between the pots and the skull. Two disc beads were over the face. A pig leg alongside the upper left arm, a shell beside the left thigh, a shell under the right hand, and a small animal leg nearby. Two strings of shell disc beads around pelvis, a bone spatula over thigh and a sherd sheet over the body. A pot was recovered near the feet.

Age: 2 - 3 years (diaphyseal length, *pars basilaris* length).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Moderately complete skull and partial infracranial skeleton. The skull is missing the inferior left parietal, inferior occipital, zygomas, superior maxilla,inferior right parietal, and the left mandibular condyle. The infracranial remains include the left humeral diaphysis, scapulae at glenoid, clavicles missing the ends, left radial and ulnar diaphyses, right radial diaphysis missing the proximal end, few hand phalanges, left ilium, tibial and femoral epiphyses at the knee, the first and second metatarsals of the right foot, and most ribs and vertebrae.

Preservation: Fair. The skull was preserved *en bloc*. The cranium was reconstructed but the face and vault could not be restored. There are hard concretions in the auditory meati of the temporals which prohibit observations. There is some post-depositional warping of the right parietal at the lambdoidal suture. The cervical vertebrae are also preserved *en bloc* with hardened grey-brown dirt. The radial and ulnar diaphyses required reconstruction at the midshafts. The bone color is a yellowish brown with a coarse texture.

Additional human remains: Fragment of an adult first cervical vertebra.

Dental Pathology: Dental wear exposes the dentin in the anterior deciduous teeth.

Cranial Pathology: Cranial vault thickness measurements range from 3 - 6 mm. Craniosynostosis of the sagittal suture. Complete obliteration of the suture without mounding of bone along the suture line. Vault asymmetry could not be evaluated because of incomplete restoration, however, the frontal appears to bulge anteriorly. The maxilla appears thickened but there is no active reactive bone present.

Skeletal Pathology: None noted.

Noteworthy Features: Concretions inhibit reconstruction. Large number of grave goods with this burial.

Comments: Small beads were sorted from the human remains. Long bone shafts (20 gm) and rib and vertebral fragments (510 gm) submitted for dating by Brooks 6/5/85. Photographs: ilium and basiocciput sexing and aging criteria, cranial vault. Radiographs: cranial vault, left humerus, radii, left ulna.

Burial Number: 1968 - 15

Archaeological context: Middle Period 4, level V, square 4H, north quadrant, AD 145 cm, orientation SW. Child burial with the upper body in the excavation area. Bones are very fragile and are disturbed by Burial 1. Pots and a piece of clamshell lie beyond the head, three marine shell beads around the neck and a set of two bronze and one shell bracelets on each wrist. A pot was found over the head at the top of the grave.

Age: 3 - 4 years (vertebral arch and body fusion).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Partial skull and partial upper infracranial skeleton. The skull is represented by the frontal, left parietal, occipital, temporals, sphenoid body, maxilla, and the mandible missing the anterior dentition and the right condyle and coronoid process. The infracranial remains include the second through fifth cervical vertebrae, three thoracic vertebral arches, rib fragments from both sides, right scapula at the glenoid, and humeral diaphyses missing the distal ends.

Preservation: Poor. The skull was preserved *en bloc* in two sections. No reconstruction was possible. The infracranial remains are incomplete, fragile and broken. There is fresh breakage of the distal left humeral diaphysis, but the element could not be restored to complete length. The ribs are fragmentary and not reconstructed. Bone color is tan-black with some orange mottling. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Slight enamel wear in the deciduous dentition. Slight calculus on the mandibular deciduous molars.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 3 mm. No evidence of porosis or reactive bone.

Skeletal Pathology: None noted.

Noteworthy Features: Tympanic thickening and dehiscence of the right temporal.

Comments: Photographs: right temporal.

Burial Number: 1968 - 16

Archaeological context: Early Period 1, level I , square 4D, middle of square, AD 165 cm, orientation S-SE. Child burial with most of the skeleton above the pelvis present but very disturbed. The skull is crushed and the feet were not excavated. Two pots beyond the head with a carnivore skull and bones beneath them, a stone adze near the right shoulder with animal bones, strings of disc beads around the waist and a smashed pot over the legs.

Age: 12 - 18 months (dental eruption).

Sex: ?Female (mandibular and iliac morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial infracranial skeleton. The cranium is represented by fragments of most of the bones of the vault, the temporals, a single maxillary incisor, mandibular body from the left to the right deciduous second molars, the left ramus, and gonion. The infracranial remains include ribs, vertebral arch fragments of three cervical and two thoracic vertebrae, right ilium and ischium, femoral diaphyses missing the distal ends, and a fragment of the left ulnar diaphysis.

Preservation: Poor. The skull is crushed and unreconstructible. Some of the vault bone fragments are preserved *en bloc* in encrusted dirt. The mandible is fairly well preserved but crushed as well. No reconstruction possible. Weathering of the ends of the femora prohibit measurement of diaphyseal lengths. The bone has a porcelain ring and is black with a grey concretion.

Additional human remains: None.

Dental Pathology: Slight enamel polishing of the deciduous right maxillary central incisor. The unerupted teeth are stained black-brown and have white tips.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 3 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Tiny disc beads concreted around vertebrae and ribs and subadult animal bones were found with the human remains.

Burial Number: 1968 - 17

Archaeological context: Middle Period 5?, level VI? , square 4F, north and west quadrants, AD 85 cm, orientation N-NW. Only the ankles and feet extend into the excavation area. The feet are together with a smashed pot beneath them as well as a pot beyond and to the left of the feet a large stone in the fill of the grave.

Age: Adult (bone size).

Sex: ?Female (infracranial measurements).

Stature: 152.8 ± 6.7 cm (5' ¼") [segment left tibia].

Completeness: Partial lower leg bones and feet. The distal right tibia and fibula, calcanei, right talus, cuboids, first cuneiforms, the left third cuneiform, left navicular, left first through fifth metatarsals, right first second and third metatarsals, proximal first and second phalanges, and a single distal phalanx.

Preservation: Fair. The fibular fragment required reconstruction. The calcanei are moderately weathered as are the ends of the metatarsals. Bone color is tan with mottled black spots and grey dirt adherent to all surfaces. Texture is coarse. There is a porcelain ring to the remains.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: The inferior medial tubercle of the left calcaneus is extended and porotic. The right tubercle is not.

Noteworthy Features: Large squatting facet of the right distal tibia. The lateral groove of the distal tibia is strongly indented.

Comments: Infracranial measurements: left distal tibial breadth 43 mm, left midshaft anterior-posterior diameter 25 mm, transverse diameter 15 mm, and circumference 66 mm, all in female range. Photographs: left calcaneus.

Burial Number: 1968 - 18

Archaeological context: Middle Period 4, level V, square 1F, north quadrant, AD 95 cm, orientation SW. Only skull in excavated area. Bone is very fragile. There is a nest of pots beyond the head.

Age: >30 years (cranial suture fusion and dental wear).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary skull and two cervical vertebral bodies. Present from the skull are fragments of the parietals, occipital at the sagittal and lambdoidal sutures, fragments of the temporals, both petrous processes, a small fragment of the right mandibular ramus including the condyle, and the right mandibular body. Two cervical vertebral bodies are present from the infracranial skeleton.

Preservation: Poor. The vault bones were reconstructed, but insufficient fragments are present to complete restoration. The bone is soft and fragile with weathering and exfoliating of the internal table. The bone color is light tan mottled with grey and coarse in texture. Some of the fragments have a porcelain ring.

Additional human remains: None.

Dental Pathology: The single right mandibular third molar present has enamel wear.

Cranial Pathology: Cranial vault thickness measurements in the posterior vault range from 6 - 7 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 19: No skeleton in pit.

Burial Number: 1968 - 20

Archaeological context: Early Period 2 - Middle Period 1?, level IV?, square G, west and mid-north quadrants, AD 145 cm, orientation E-NE?. Only top of skull present in excavation area, two pots and a clamshell and a stone present beyond skull.

Age: 20 - 25 years (dental wear and eruption) . .

Sex: Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Nearly complete skull. Missing are the left mandibular condyle, left zygoma, nasal processes of the maxilla, left supraorbital and glabella regions of the frontal, inferior occipital including the condyles, and the sphenoid body.

Preservation: Good. The mandible was well reconstructed and is complete but for the condyle. The maxilla was restored. The cranial vault was reconstructed with fair result, but there is warping of the left parietal, causing a lateral compression of the vault. There are insufficient fragments to complete restoration. Hard grey-brown concretions are present on some bones and in some foramina.

Additional human remains: None.

Dental Pathology: Attrition exposes the dentin in the incisors of both jaws. There is a dark brown-black stain on the occlusal surface of the posterior teeth of both jaws, the right side is darker than the left. The left mandibular third molar is impacted, the tooth has erupted mesially so that the distal crown surface forms the occlusal plane.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 9 mm. Cribra orbitalia of both orbits.

Skeletal Pathology:

Noteworthy Features:

Comments: Aging: Cranial suture closure post. $\Sigma \geq 1$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: maxilla and mandible Radiographs: cranial vault.

Burial Number: 1968 - 21

Archaeological context: Middle Period 5, level VI?, square 4F, NE quadrant, AD 112 cm, orientation W-NW. Adult burial with complete lower body but upper body removed by Burial 26. Flexed, with the legs bent to the left and hands in the lap. This is the only flexed burial in the 1968 excavations.

Age: 40 - 45 years (auricular surface morphology).

Sex: Female (*os coxae* and infracranial morphology).

Stature: 153.1 ± . cm (5' ¼") [right ulna].

Completeness: Partial infracranial skeleton. Present are the complete right ulna, right radius missing the distal end; right scaphoid, lunate and metacarpals; four left carpals, first three metacarpals and phalanges from both hands, *os coxae* missing the pubes; femoral fragments, proximal right tibial shaft, left tibial shaft, patellae, fibulae shaft fragments, right foot missing two cuneiforms, left foot missing the cuboid and one cuneiform, the proximal phalanges of both feet, sacral fragments, and the third through the fifth lumbar vertebra.

Preservation: Fair. The right ulna and ilium are complete. The foot bones are fairly well preserved. The ends of the long limb bones are broken off, weathered and unreconstructible. Most breakage is old. Grayish dirt adheres to all bones. Bone color is orange-brown with black mottling. Texture is coarse. There is a porcelain ring to most bones.

Additional human remains: A single proximal hand phalanx.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the hand, auricular, and knee joints. The metatarsals and tarsals have moderate osteoarthritic changes of the metatarsal-tarsal joints without extension to the phalanges. There is erosion of the right cuboid along the inferior proximal surface at the edge of the calcaneal facet. The base of the third metatarsal is rotated toward the fourth metatarsal, with no evidence of thickening of the cortex. All of the metatarsals have well-marked heads and compressed proximal ends. The fifth metatarsal has an enlarged fourth metatarsal articular facet which includes a raised sharp ridge along the dorsal edge of the bone. The fifth metatarsal is bowed, apex medially. The left foot has a large osteophyte of the calcaneus extending from the left superior lateral edge of the cuboid facet, and an osteophyte of the navicular at the medial end, opposite the tubercle. There is a smooth walled erosion of the first cuneiform at the second cuneiform articular surface. The fourth metatarsal facet of the third metatarsal is expanded and has coarse, rugged bone growth around it. The fourth metatarsal has expanded facets at the base, with sharpening of all rims. The fifth metatarsal has expansive lipping of the fourth metatarsal facet. The proximal foot phalanges appear normal. The fifth lumbar vertebra has moderate lipping and porosis of the superior end-plate with some reduction in rim height. The inferior end-plates of both the fourth and fifth lumbar vertebrae are normal in appearance.

Noteworthy Features: Two sesamoid bones are present in the left foot.

Comments: Aging: Auricular surface V 40-44. Photographs: metatarsals, fifth lumbar vertebra. Radiographs: right ulna.

Burial Number: 1968 - 22

Archaeological context: Middle Period 5?, level VI, square 4F, north and east quadrants, AD 110 cm, orientation N-NE. Supine adult burial with the lower body and left arm removed by the interment of Burial 26. A large crushed pot was located over the right shoulder.

Age: 40 - 45 years (cranial suture fusion and dental wear).

Sex: Female (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Moderately complete skull and partial infracranial skeleton. The cranium is missing the right zygoma, bilateral upper maxilla, left nasal process, right supraorbital area, and the sphenoid. The mandible is missing the bilateral condyles. Infracranial remains include the clavicular shafts, scapulae fragments, few rib fragments, left humeral shaft with detached head, right proximal radius and ulna, the cervical and thoracic vertebrae, and a single hand phalanx.

Preservation: Fair. The cranial vault was reconstructed, including the temporals, but the face could not be attached. The mandible was reconstructed at the midline. The teeth have broken off at the roots and been repaired. The vertebrae are very weathered. The bone color is tan mottled black with coarse texture and a porcelain ring.

Additional human remains: None.

Dental Pathology: Premortem loss of the maxillary left third molar with incomplete alveolar resorption before death, and loss of the mandibular right lateral and left central incisors with complete alveolar healing. Moderate calculus is noted on the remaining mandibular anterior teeth. Wear exposes the dentin in most teeth. Large caries are noted on the mandibular left third premolar and the maxillary right central incisor. Abscessing at the roots of the right maxillary third premolar has exposed the buccal root, and an additional abscess of the mandibular left canine socket is noted. The maxillary right central incisor is black in color and may reflect premortem death of the tooth.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 10 mm. The sagittal suture is obliterated and the skull appears very short and small.

Skeletal Pathology: None noted.

Noteworthy Features: Maxillary lateral incisors have a large cingulum fold. The maxillary left canine has rotated into the third premolar, so that the labial crown surface of the canine rests against the mesial side of the premolar crown.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 12$ $\geq 45.2 \pm 12.6$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. Radiograph: cranial vault.

Burial Number: 1968 - 23

Archaeological context: Middle Period 5, level VI, square 1F, southeast quadrant, AD 95 cm, orientation NW. Complete supine burial with the right clavicle shifted down to the abdominal region, and a disturbance of the right leg. Associated artifacts include two pots between the skull and the right shoulder, a small pot over the left shoulder, a clamshell under the skull, a plain pot over the abdomen, a large bronze ring or small bracelet over left wrist, and a sherd sheet under the feet.

Age: 35 - 40 years (cranial suture fusion, auricular surface morphology and dental wear).

Sex: Male (cranial and *os coxae* morphology).

Stature: 170.0 ± . cm (5' 5¾") [left radius].

Completeness: Moderately complete skull and infracranial skeleton. The skull is missing most of the right parietal, fragments of the maxilla, and inferior occipital. The infracranial skeleton is missing the ends of the clavicles, left distal humerus, right distal radius and ulna, carpals and some hand phalanges, sternum, much of the right *os coxae*, distal femora, tibiae, patellae, fibulae except for a single fragment, vertebral bodies, most vertebral arches, the sacrum, and most ribs.

Preservation: Fair. Incomplete and weathered. The cranial vault was reconstructed but appears shortened. The face could not be restored. The mandible was reconstructed. Little reconstruction of the long limb bones was possible. There is weathering loss of most of the cancellous bone. The radius is the only complete element. There is a small amount of red-stained dirt on the posterior occipital (?ocher), it appears to be concreted soil. Bone color is a tan mottled black. There is a porcelain ring to the bones and the texture is coarse.

Additional human remains: None.

Dental Pathology: Premortem loss of the maxillary third molars. Slight calculus on the teeth of both jaws. Slight to moderate alveolar resorption in the maxilla. Abscessing of the maxillary left third premolar socket at the alveolar margin. Marked hypoplasia of the left maxillary central incisor, which is not bilaterally symmetrical, and therefore may represent trauma. The defect is present on both sides of the crown and consists of a deep groove horizontal to the tooth axis, approximately one-third of the distance from the top of the crown. Measurement of the height of the defect suggests it occurred at age 3 years. The left maxillary canine has a small, oval-shaped, pit-like defect of the labial surface enamel which is also not bilaterally symmetrical. Measurement of the height of the canine defect suggests occurrence at age 4.2 years. Slight brown stain on the occlusal surface of the teeth of both jaws.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 7 mm.

Skeletal Pathology: Slight osteoarthritis of the right glenoid, humeral head, and the distal articular facets of the first metacarpals.

Noteworthy Features: Gnaw marks on the right femur along the *linea aspera* and on the proximal anterior shaft. The intertrochanteric lines of the proximal femora are strongly marked, raised 3 mm off the cortex, and nearly form a tubercle in the region of attachment of the iliofemoral ligament.

Comment: Aging: Auricular surface IV 35-39; Cranial suture closure post. $\Sigma \geq 5$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Radiographs: left radius. Photographs: gnaw marks on femur, anterior femoral markings, mandible and maxilla.

Burial Number: 1968 - 24

Archaeological context: Middle Period 6?, level VII, square 4F, east quadrant, AD 100 cm, orientation W-SW. Only feet and ankles extend into excavation area. Heels together, feet separate. Two pots and a piece of red pigment at the mid-grave over the lower end of the pit, beyond the feet. Additional bag containing proximal tibial shaft states that it was taken from the side wall.

Age: Middle-aged (osteoarthritis).

Sex: ?Male (infracranial bone size).

Stature: 172.4 ± 4.3 cm (5' 8") [left tibia].

Completeness: Incomplete lower legs. Present are the complete left tibia, distal end of the right tibia, distal fibulae, the calcanei, tali, cuboids, naviculare, first cuneiforms, right second and third cuneiforms, bilateral first through the fifth metatarsals, and five proximal phalanges.

Preservation: Good. Although incomplete, there is little weathering of the bones. A grey-brown dirt is adherent. Some reconstruction required of recent breaks of the metatarsals. Bone color is a mottled tan and black. Bones have a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: The left third metatarsal has an enlarged nutrient foramen (3 x 2 mm) in the lateral proximal midshaft. There is slight osteoarthritis of most of the articular surfaces of the feet.

Noteworthy Features:

Comments: Intrusive adult remains in Burial 25 belonged here: distal left tibia, distal right tibia, fibulae. Photographs: third metatarsal. Radiographs: left tibia.

Burial Number: 1968 - 25

Archaeological context: Middle Period 6?, level VII, square 4F, south and west quadrants, AD 110 cm, orientation SW. Parts of the skull, lower arms, femoral and lower legs of a child are present but fragmentary and badly disturbed. The body is supine with a pot to the right of the skull, a piece of stone bracelet at the right ankle and a human cranial fragment beyond the right ankle.

Age: 9 - 11 years (dental formation and eruption).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial infracranial skeleton. Present from the skull are fragments of the left parietal, left temporal at the mastoid, four maxillary teeth, and the mandible missing the ascending rami and anterior teeth. The infracranial skeleton includes the left humeral mid-diaphysis, fragments of the left radial and ulnar diaphyses, left femoral diaphysis, proximal right femoral diaphysis, right tibial diaphysis, and fibular diaphyseal fragments.

Preservation: Poor. Disturbed and fragmentary. Skull bones are very weathered, exfoliating and stained a mottled black. No reconstruction of the cranial vault fragments was possible. The infracranial skeleton is fragile and incomplete with few epiphyses recovered. Unable to completely restore a long limb diaphysis. Bone seems soft, no porcelain ring. The infracranial bone is colored an orange-tan and black.

Additional human remains: Adult lower legs assigned to Burial 24. Anterior right parietal, including the squamosal suture and the lower coronal suture, of an adult.

Dental Pathology: Mixed dentition in mandible with extreme wear of the deciduous molars. There is chipping of the buccal edges of the crowns of the second molars. Moderate hypoplasia is noted in the form of ridges and an enamel color change, in the maxillary permanent central incisors, right lateral incisor and the second molar crown. On the superior crown a faint groove is followed by a ridge marking an enamel color change from yellow to white below, followed by two additional ridges. In the lateral incisor there is an enamel color change at the base of the crown from yellow to white, with a coarser and more wrinkled enamel in the white section. Measurements of these defects from the cemento-enamel junction distribute over the 2 - 4 year age range. On the second molar, the color change is similar, and measurement suggests an isolated defect occurring at age 6.2 years.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 9 mm.

Skeletal Pathology: None noted.

Noteworthy Features: The infracranial remains appear very small for dental age.

Comments: Photographs: mandible, hypoplasia. Radiographs: mandible.

Burial Number: 1968 - 26

Archaeological context: Middle Period 6, level VII, square 4F, NE quadrant, AD 118 cm, orientation SW. Supine, extended burial with crushed skull and missing parts of the arms. A bowl, pig hindquarters, clamshell and human cranial bone fragments beyond skull. Pot on chest and two circular masses of termite frass (former wooden objects?) under and to the right of the body, 25 - 30 cm below. Sherd sheet under feet, two large marine shell rings and a top-like object of bone between lower legs.

Age: 35 - 40 years (pubic symphysis, auricular surface, sternal rib end and cranial suture fusion).

Sex: Male (cranial and *os coxae* morphology).

Stature: 161.5 ± . cm (5' 3½") [right humerus].

Completeness: Partial skull and moderately complete skeleton. The skull is missing most of the parietal, sphenoid, left maxilla, nasal bones, supraorbital region of the frontal, the left mandibular body and right coronoid process. The infracranial remains are missing most cervical vertebrae, rib bodies, left proximal radius and ulna, right distal radius, most carpals and distal hand phalanges, right auricular surface, left proximal femoral shaft, ends of the right femur, patellae, proximal tibiae and fibulae, right metatarsals and smaller tarsals, most foot phalanges, and few vertebral arch fragments.

Preservation: Fair. The cranial vault required reconstruction with attachment of the left parietal and occipital. There are insufficient fragments to complete the restoration. The right arm bones are restored. Cancellous bone is weathered and nearly all bones are incomplete. Bone color is mottled orange-tan and black and coarse to the touch. Bones have a porcelain ring and grey dirt concretions.

Additional human remains: A proximal left radial shaft of an adult, and a fragment of the left humerus at the deltoid [these remains could belong to Burial 22].

Dental Pathology: There is marked alveolar resorption of the mandibular right first and second molar sockets, with premortem loss of the third molar. Wear exposes the dentin in the mandibular anterior teeth and the first molars. The entire mandibular right second molar crown has a light brown stain.

Cranial Pathology: There is a coarse healed porosis of the superior vault. The pits do not perforate the outer table and are approximately 0.1 mm in diameter. There is no evidence of active reactive bone. Cranial vault thickness measurements range from 4 - 6 mm.

Skeletal Pathology: Slight osteoarthritis of the lower lumbar vertebral bodies and some upper thoracic facets. The right inferior facet of the ?first thoracic vertebra has a "rolled" lipping posteriorly and is expanded laterally and inferiorly, when compared to the opposite side. The ?second thoracic vertebra has lipping of the right superior facet, which matches the opposing first thoracic vertebral articular surface. These changes are suggestive of a degenerative loss of disc space through compression. There is lipping of the medial and posterior tubercle of the left calcaneus. The right calcaneus is incomplete.

Noteworthy Features: Long, gracile looking long limb bones. Ossified costal cartilage. Markedly platycnemic tibiae.

Comments: Subadult animal legs were sorted from the human remains. Aging: Pubic symphysis McKern $\Sigma 14$ 35.8±3.89, Todd VII 35-39, Suchey IV 35.2±9.4; Auricular surface II 25-29; Sternal rib end V 38.8±7.00; Cranial suture closure post. $\Sigma \geq 5$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Radiographs: right humerus. Photographs: marked resorption of right dentition, first and second thoracic facets, lumbar osteoarthritis, skull porosis.

Burial Number: 1968 - 27

Archaeological context: Middle Period 6?, level VII, square 3F, NW quadrant, AD 110 cm, orientation SW. Most of the pelvis and legs and some bones of the upper arm and skull are present but the latter area very disturbed. The feet are missing. there are two pots beyond the head, a part of a pot by the left shoulder, clamshell fragment by the left femur, bowl to the right of the upper body, a mold fragment and a potsherd disc to the right of the legs, as well as a bronze object on the left femur.

Age: 50 - 60 years (auricular surface and cranial suture fusion).

Sex: Male (cranial and *os coxae* morphology).

Stature: 164.2 ± 4.0 cm (5' 4¾") [right bicondylar femur and tibia].

Completeness: Moderately complete skull and partial infracranial skeleton. The skull is missing the left mandible except a single loose tooth, right maxilla, nasal bones, fragments of the supraorbital region of the frontal, sphenoid body, and fragments of the occipital at the foramen magnum. The infracranial skeleton is missing the scapulae, right clavicle, humeral heads, right ulna and radius except for the distal end, left ulna ends, most carpals and hand phalanges, much of the left *os coxae*, right pubis, ends of the fibulae; most tarsals, metatarsals and phalanges, the vertebrae except the lower lumbar arches and three thoracic bodies, and most of the ribs.

Preservation: Fair. The cranial vault was reconstructed from many fragments with fair results. There is warping of the frontal at the bregma which doesn't allow good joins of the anterior frontal. Concretions of grey dirt on the vault bones could not be removed with water. Most of the breakage is old. Reconstruction of all long limb bones was required with partial restoration of the left femur and tibiae. There are gnaw marks of the left proximal humeral shaft. All bones have a porcelain ring and are mottled tan and black with grey concretions adherent to all surfaces. Bone texture is coarse because of the concretions.

Additional human remains: Left humerus missing head; left ulna and left radius missing distal ends; three left carpals, distal first metacarpal, and a fibular shaft fragment all from the same individual (?female, adult). An additional left radius missing the ends.

Dental Pathology: The single tooth has wear to the dentin and a cracked lingual edge.

Cranial Pathology: The cranial vault appears short and broad. The sagittal, coronal and lambdoidal sutures are all at least moderately fused, with identification of the suture lines using a hand lens. There is only a slight amount of warping of the frontal, likely due to reconstruction, resulting in a 4 mm gap at the left coronal suture. The vault appears symmetrical, but the occipital seems short and the posterior vault appears flattened. Cranial vault thickness measurements range from 5 - 8 mm. The mastoid processes are asymmetrical, the left is greater than the right.

Skeletal Pathology: In the medial-lateral view of the distal left humerus, the normal slight anterior curve of the shaft and the anterior extension of the coronoid has been lost, suggesting a healed supracondylar fracture. There is a slight raised ridge on the shaft above the joint. There is osteophytic growth around the capitulum with eburnation of the central articular surface. The left radius is present and has an osteophyte along the lateral head and eburnation of the central articular surface, but the head and neck appear normal in alignment, suggesting the radial head was not fractured. The proximal left ulna is not preserved. Radiograph of the distal left humerus demonstrates complete remedullarization of the bone, osteoarthritis of the coronoid facet, loss of the anterior extension of the distal metaphysis.

Radiograph of the left radius demonstrates osteophytosis of the head. Probable healed supracondylar fracture of the left humerus. The presence of osteophytosis and eburnation confirms use of the elbow joint after the injury, with disruption of the joint mechanics and likely restriction of flexion and rotation of the forearm.

Noteworthy Features: Gnaw marks of the left proximal humeral shaft. Extreme platycnemia of the tibiae. There are strongly marked entheses of the distal tibiae and intertrochanteric lines of the femora.

Comments: The left zygoma, mandible and maxilla fragments were added here from Burial M101, and are still stored as M101 in the laboratory. Aging: Auricular surface VII 50-59; Cranial suture closure post. $\Sigma \geq 12$ ±45.2±12.6, ant. $\Sigma \geq 5$ ≥41.1±10.0. Radiographs: left femur, left radius, left humerus, skull. Photographs: ovale-spinosum confluence, cranial vault shape, left humerus, left radius.

Burial Number: 1968 - 28

Archaeological context: Middle Period 5?, level VI, square 3F/4F, middle of square, AD 100 cm, orientation E-NE. Only right ulna and right leg present. One pot and a fragment of a second pot to the right of the leg, but association is doubtful.

Age: Adult (infracranial bone size and epiphyseal fusion).

Sex: ?Female (infracranial bone size). **Stature:** Cannot be determined.

Completeness: Fragmentary infracranial remains. Present are the left distal humeral shaft and end, left radial fragment, left femoral shaft, right femoral shaft, and the proximal left tibial shaft missing the proximal end.

Preservation: Fair. Incomplete, fragmentary and extremely weathered. There are few associated fragments and the long limb bone shafts were reconstructed at the midpoints. There is fresh breakage of the radius and the proximal right femur, all other breakage is old. Bone texture is coarse and there are coarse concretions on all the bones. Bone color is tan mottled with black.

Additional human remains: None. **Dental Pathology:**

Cranial Pathology: **Skeletal Pathology:** None noted.

Noteworthy Features: The tibia shaft fragment is extremely platycnemic.

Comments: Few observations or measurements could be made. Circumference of the tibia at the nutrient foramen falls in female range, while circumference at the midshaft falls in the mid-female and lower male range.

Burial Number: 1968 - 29

Archaeological context: Early Period 2, level II, square 1F/0F, south quadrant, AD 130 cm, orientation N. Partially disturbed by Burial 64. Fragments of the skull and left leg are present. The skull is crushed. A stone adze and red pigment were found over the skull, a pot over the probable location of the trunk, and a second pot by the left shoulder.

Age: 7 years (dental eruption and formation).

Sex: ?Male (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and moderately complete infracranial skeleton. The skull is represented by the mandible, maxilla, frontal missing the supraorbital region, left temporal missing the mandibular fossa, fragments of the left parietal, and the right occipital condyle. Present from the infracranial skeleton are the left distal clavicle, scapula at the glenoid, left humeral diaphysis, left proximal ulnar diaphysis, radial diaphyses, some hand phalanges, left ilium, right distal femoral diaphysis, tibial diaphyses, fibular diaphyses missing the distal ends, left calcaneus, ribs, and two lumbar vertebral fragments.

Preservation: Fair. The right radial diaphysis and left tibial diaphysis were completely restored. There are insufficient fragments for other reconstruction. The bone color is mottled orange-tan with a coarse texture and a grey dirt adherent. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Slight wear of the deciduous molars with dentin just beginning to show. The occlusal surface of the mandibular molars is stained brown.

Cranial Pathology: Cranial vault thickness measurement averages 3 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: These remains are more complete than noted by excavators. Radiograph: right radius.

Burial Number: 1968 - 30

Archaeological context: Middle Period 4?, level VI?, square 2F, SE quadrant, AD 105 cm, orientation N-NE. Only the femora are present, the remainder of the skeleton was removed by disturbances from level VIII and IX.

Age: Adult (infracranial bone size).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Incomplete femora. The femoral shafts from below the lessor trochanter to the distal end, as well as condyle fragments are present.

Preservation: Fair. The right femoral shaft required reconstruction at the midshaft. The condyles are extremely weathered and could not be restored to the shaft. The breakage is old. The bone color is dark brown-black with tan mottling. There is grey dirt adherent to all bones. Bone texture is smooth, almost waxy.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features: There is a recent looking "cut" mark of the femoral condyle fragment on the superior patellar surface. The cut surface is white in color.

Comments: Measurements of the femoral shaft fall into the female range. Although initially assigned to Middle Period 5, the burial was reassigned to MP 4? (Bayard 1985).

Burial Number: 1968 - 31

Archaeological context: Middle Period 4?, level V, square 4F, south quadrant, AD 115 cm, orientation SW. Only the feet extended into the excavation area. A large pot was recovered over the feet.

Age: Adult (epiphyseal fusion and infracranial bone size).

Sex: ?Female (infracranial measurements).

Stature: 156.4 ± 4.4 cm (5' 1½") [estimated length nearly complete left fibula].

Completeness: Partial lower left leg and foot bones. Present are the left tibia missing the proximal end, the left fibula missing both ends, left tarsals and metatarsals, with the third and fifth missing the distal ends, and four proximal foot phalanges.

Preservation: Fair. Incomplete, fragmented and weathered bones. There are other bone fragments. The cancellous bone is weathered. The fibular shaft was reconstructed from seven fragments but the length could not be restored. Bone color is mottled tan with black, and the texture is coarse.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the first metatarsal facets. There is a slight extension of the medial tubercle of the inferior left calcaneus.

Noteworthy Features:

Comments: Radiograph: left fibula.

Burial Number: 1968 - 32

Archaeological context: Middle Period 4, level V, square 3F, south quadrant, AD 135 cm, orientation SW. Supine extended burial with disturbance of the lower left arm. The skull was placed over pelvis (?decapitated). Five clamshells in place of skull, bronze fragment at the left shoulder, ovid mandible next to the right arm and bird bones over the neck and chest. A bowl and pot over the abdomen. Three pierced dog canines around neck and a large pot adjoining the skull over the pelvis.

Age: 25 - 30 years (epiphyseal fusion and auricular surface morphology).

Sex: Male (cranial morphology).

Stature: 161.5 ± 4.2 cm (5' 3½") [right fibula].

Completeness: Moderately complete skull and infracranial skeleton. The skull is missing the right half of the mandible, right upper maxilla, anterior dentition of both jaws, right zygoma, sphenoid body, right petrous and anterior temporal. The infracranial skeleton is missing the sternum, first three cervical vertebrae, lower lumbar vertebral arches, sacrum, most of the *os coxae*, right scapula and left scapular blade, distal left humerus, proximal left radius and ulna, most carpals and few metacarpals, distal femora, proximal left tibia and fibula, two left cuneiforms, middle and distal foot phalanges, and sternal rib ends.

Preservation: Fair - Good. There is much old breakage and weathering of all bones. The cranial vault was reconstructed with good restoration of the frontal, parietals, and temporals. There is some warping of the temporals. Reconstruction of the right forearm bones, and right tibia and fibula to complete lengths. Fresh breakage of the distal right humeral shaft without the missing fragments. The vertebrae are in good condition, most bodies are preserved while the *os coxae* are very fragmentary. Bone texture is coarse and color is mottled tan and black with a grey dirt adherent.

Additional human remains: Left femur missing the distal end and with the head in fragments; ?ulnar shaft fragment, long limb bone fragments and left patella fragment [does not match Burial 39].

Dental Pathology: Moderate calculus on the posterior teeth of both jaws with slight alveolar resorption at the maxillary premolar and molar sockets and slight rolled rim of the mandibular molar sockets. Dental attrition is of the enamel except in the left mandibular first molar where dentin is exposed.

Cranial Pathology: Cranial vault thickness measurements range from 3 - 8 mm, with a healed porosis of the superior parietals, frontal and occipital. The cortex has a slightly irregular appearance but is cortical bone throughout. The sagittal suture is obliterated except for small lengths at the bregma and lambda. The lambdoidal suture is also obliterated except at the asterion and near the lambda. The coronal sutures are identifiable, but have significant fusion. The cranium appears very small, low and short. There is no mounding of any of the sutures and no apparent compensatory growth. Superiorly, the vault does not appear excessively broad. Some asymmetry is seen in the flattening of the right posterior vault, so that the right parietal eminence is more anterior than the left.

Skeletal Pathology: The ?eleventh thoracic vertebra has an (9 x 8 mm) expansive lesion of the right lateral superior end-plate. There is no sign of remodeling. The inferior end-plate has impressions of the right and left posterior sides, measuring 11 x 5 mm and 8 mm, and the larger joins the superior defect internally. Under magnification, the impression on the left side appears remodeled with a porotic region surrounding it. The anterior centrum of the ?twelfth thoracic vertebral has an erosion of the right side with exposure of the trabeculae. Remodeling may be present, but weathering and damage complicates observations. The inferior end-plate of this vertebra has several lobulated, expansive lesions which penetrate to the interior. There is no evidence of thickening of the trabeculae. Radiograph of the affected vertebrae demonstrate circular areas of bone loss, with indistinct borders and no sclerosis, surrounding bone appears coarsened. All rib fragments were examined for pathology and appear normal. Radiograph of the right fibula demonstrates a lytic lesion of the proximal metaphysis, semi-circular in shape, without expansion of the cortex, and without sclerosis. Association with these vertebral lesions and the lack of reactive bone formation suggests a granulomatous infection (e.g. tuberculosis).

Noteworthy Features: Agenesis of the maxillary right third molar.

Comments: The skull is definitely male, with an inion and large mastoid processes and a robust occiput. The *os coxae* are incomplete and the femoral measurements are on the lower end of the range for males. The first three cervical vertebrae are not present. For skull to belong to this person, must conclude that cranial suture closure is pathological. Aging: Auricular surface II 25-29; Cranial suture closure post. $\Sigma \geq 16$ $\geq 48.8 \pm 10.5$, ant. $\Sigma \geq 6$ $\geq 43.4 \pm 10.7$. For aging: the teeth are young adult, with exposure of the dentin just beginning; there is complete fusion of some of the sutures of the cranium suggesting old age, the medial clavicle is open and the vertebral rims appear young. Radiographs: vertebrae, right tibia, right radius, right ulna, right fibula, skull. Photographs: skull, vertebra, tooth wear.

Burial Number: 1968 - 33

Archaeological context: Middle Period 4, level V, square 2F, SE quadrant, AD 140 cm, orientation W-SW. Adult skeleton, complete except for upper arm, supine, extended, skull crushed. Nest of pots and a pottery rectangle with legs found beyond head, smashed pot under skeleton. Another nest of pots on top of grave over pelvis, two pots over feet.

Age: 17 - 20 years (epiphyseal fusion).

Sex: ?Male (*os coxae* morphology and cranial morphology).

Stature: Cannot be determined.

Completeness: Nearly complete skull and infracranial skeleton. The skull is missing the left ascending ramus and anterior teeth of the mandible, the central maxillary incisors, a portion of the inferior left malar, and the left superior temporal. The infracranial remains are missing the manubrium, the third and seventh cervical and the first thoracic vertebrae, most of the sacrum, bilateral *os pubis*, sternal rib ends, left carpals, most distal hand and foot phalanges, and the blades of the scapulae.

Preservation: Good. The cranium was reconstructed with good results, although the left temporal and face could not be restored because of insufficient fragments. The mandible was reconstructed at the midline. Reconstruction was required of all long limb bones. Good representation of the epiphyses and vertebrae with preservation of cancellous bone. Grey dirt is adherent on all remains. Bone color is mottled tan and black. Texture is coarse with a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology: Slight calculus on most maxillary and mandibular teeth. There is slight hypoplasia in the form of multiple horizontal grooves of the mandibular right incisors and canine. Measurement of the height of the defects in the incisors suggests physiological stress at age 2.5-3.5 years and in the canine at age 3.5-4.5. Dental wear exposes the dentin in the anterior teeth and the enamel in the posterior teeth. The third molars are erupting in the mandible and are unerupted in the maxilla.

Cranial Pathology: Cranial thickness measurements range from 4 - 9 mm. The grey dirt adhesions complicate observations of a nearly healed slight porosis of the superior vault, visible with a hand lens.

Skeletal Pathology: Spondylolysis of the fifth lumbar vertebra with complete separation at the *pars interarticularis* just below the superior facets and involving the inferior edge of the left facet. On both the vertebral centrum and neural arch fragment, the left "articulation" has a small, flat facet; while on the right there is an expanded, coarsely porotic and osteophytic articulation. The fourth lumbar vertebra and sacrum are not recovered. The left tibia has a well-healed "bump" (54 x 21 mm) of cortical bone on the medial border and anterior spine at the proximal end of the distal third. There is no circumferential swelling. There is evidence of longitudinal striations along the entire shaft of the bone. The fibula appears normal in morphology. Post-depositional breakage at the site of the bulge documents an intact marrow cavity. Probable healed periosteal contusion of the left tibia.

Noteworthy Features: Skull is dolicocranic in appearance.

Comments: Aging: Auricular surface I 20-24; Cranial suture closure post. Σ=0 =30.5±9.6, ant. Σ=0 =32.0±8.3. Radiographs: cranial vault, fibula, left radius and ulna, left humerus. Photographs: cranium, mandible, maxilla, spondylolysis, tibia.

Burial Number: 1968 - 34

Archaeological context: Middle Period 1, level IV, square 2F, middle square and north quadrant, AD 110 cm, orientation W-SW. Secondary burial, most of the skeleton is present except one leg, feet, most of the hand bones, and vertebrae. The skull was at the SW end of the pit with the long limb bones in the center and the ribs to the east. Three pots, an animal jaw and red pigment were found near the skull.

Age: 7 - 8 years (dental eruption).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Moderately complete skull and partial infracranial skeleton. The cranium is missing the right maxilla, right inferior parietal, zygomas, and fragments of the basiocciput. The mandible is represented by the right ascending ramus. The infracranial remains include the bilateral axial rib end fragments, three thoracic and one lumbar vertebral arches, fragments of the *os coxae* including the iliac at the sciatic notch and acetabula, the distal right clavicle, right scapula, right humeral diaphysis missing the distal end, radial diaphyses, right ulnar diaphysis, right femoral diaphysis and left femoral diaphysis missing the ends.

Preservation: Good - Fair. The cranial vault was reconstructed with good result, but the face and right parietal are weathered and missing,. The right femoral and left radial diaphyses are complete. The infracranial skeleton is weathered, coarse to the touch and mottled orange-tan and black. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Wear of the deciduous left maxillary dentition exposes the dentin.

Cranial Pathology: Cranial vault thickness measurements range from 3 - 6 mm; the maximum thickness is noted at the lambda. There has been complete obliteration of the sagittal suture endocranially and moderate degrees of closure ectocranially. There doesn't appear to be any asymmetry or shape distortion of the vault, but missing portions make this assessment difficult. There is a slight porosis of the bilateral temporal around the auditory meati.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: A small barrel-shaped bead was sorted from the human remains. Photographs: skull, sutures, temporal porosis. Radiographs: skull, right femur, left radius.

Burial Number: 1968 - 35

Archaeological context: Middle Period 4?, level V, square 1F, SW quadrants, AD 123 cm, orientation S-SW(?). Only a crushed skull and part of the right arm present, all bones fragile. One pot to the left side of the pelvis.

Age: 3 - 5 years (dental eruption and occipital fusion).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and infracranial skeleton. Present from the skull are the left half of the mandible, the temporals, parietal fragments, occipital missing the basiocciput, and a frontal fragment. The infracranial remains include the proximal radial diaphyses, proximal right ulnar diaphysis, a single rib body, and a single thoracic vertebral facet.

Preservation: Fair - Poor. Incomplete and fragmentary. The mandible is best preserved with weathering of the condyles. The cranium was incompletely reconstructed from small fragments. There are insufficient fragments for the missing material. Bone color is mottled tan and black and there is a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology: Slight wear of the deciduous left mandibular molars.

Cranial Pathology: Cranial vault thickness measurements are a uniform 3 mm. Tympanic thickening on the right side.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Photograph: tympanic thickening. Radiograph: mandible.

Burial Number: 1968 - 36

Archaeological context: Early Period 2, level II, square 1F, middle of south quadrant, AD 120 cm, orientation N. Only skull, left arm, some bones of the pelvis and ribs are present. Skeleton is supine, skull crushed. What may be fragments of leg bones lay to the right of the original position with two pots. Two more pots to the right of the trunk and a fifth over the original position of the legs.

Age: 5 - 6 years (dental eruption and diaphyseal lengths [3 - 4 years]).

Sex: ?Female (iliac morphology).

Stature: Cannot be determined.

Completeness: Partial cranium and infracranial skeleton. The skull includes the bilateral maxilla at the molars, the frontal missing the supraorbital region, right parietal, occipital missing the *pars lateralis*, right temporal, and right zygoma. The infracranial skeleton includes the left scapula, manubrium; left humeral, radial and ulnar diaphyses, ilium, right proximal femoral diaphysis, a distal tibial diaphyseal fragment, and few ribs and vertebrae.

Preservation: Poor. Fragmented, fragile and incomplete. Reconstruction of the cranial vault bones from small fragments is incomplete because of insufficient material. Weathering of the cancellous bone of the infracranial skeleton is present. Bone color is a tan-mottled black. Texture is coarse and bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Wear of the maxillary deciduous molars to the dentin in the first molars and nearly flat in the second molars. The left maxillary deciduous canine crown has a severe hypoplasia in the upper half. There are three closely spaced horizontal lines at the midcrown, with a groove below. The top of the tooth is dysplastic, narrow, and poorly formed.

Cranial Pathology: Cranial vault thickness measurements range from 3 - 4 mm. Possible craniosynostosis of the lambdoidal suture. Reconstruction of the vault includes attachment of the right parietal to the right occipital and demonstrates fusion of the lambdoidal suture on the endocranial surface at this point. A fragment of the occipital on the left side extends past the lambdoidal suture and fusion is present on the endocranial surface. The bones are not separated at the suture line.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Radiographs: left humerus, radius and ulna. Photographs: lambdoidal suture left, deciduous canine hypoplasia.

Burial Number: 1968 - 37

Archaeological context: Middle Period 4?, level V, square 2F/2E, middle of the square, AD 130 cm, orientation ?SW. Only the bones of one leg are present, the remainder of the skeleton removed by Burial 33. Sherds and fragments of two pots to the east of Burial 33 may be in the fill of this burial.

Age: Adult (epiphyseal fusion).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragments of the lower leg bones. Present are the left patella, bilateral tibial shafts missing the ends, left talus, posterior calcaneal fragments, first cuneiforms, bilateral metatarsal shafts, and proximal foot phalanges.

Preservation: Fair. Although incomplete, the bone is solid and of good quality. There is old breakage of the tibiae. No reconstruction was possible because of insufficient fragments. The foot bones are extremely weathered and fragile. Bone color is tan with very little mottling and the bones have a porcelain ring.

Additional human remains: Proximal right humeral diaphyseal fragment of an infant/small child. A right femoral shaft missing the head and condyles, left tibial plateau, left ilium fragment including the sciatic notch and the anterior spine, and a fragment of the left ulna at the midshaft are assigned to Burial 38, but were not physically moved.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 38

Archaeological context: Middle Period 4?, level V, square 2F, SE quadrant, AD 120 cm, orientation SW. Bones of one leg present, while the remainder of the skeleton was removed by Burial 33.

Age: Adult (infracranial bone size).

Sex: ?Male (infracranial bone measurements).

Stature: 166.6 ± 4.5 cm (5' 5½") [right tibia].

Completeness: Incomplete infracranial skeleton. Present are a right ulnar midshaft fragment, left ilium at the sciatic notch and an iliac blade fragment, right femur missing the head and condyles, left femur missing the distal end, right tibia, left tibial plateau, and a distal fibular shaft fragment.

Preservation: Good. What is present is well preserved. The right tibia was reconstructed to its complete length with some weathering of the distal end. The left femoral shaft was reconstructed but there is old breakage of the distal end. Bone color is mottled black and orange-tan with a smooth texture and grey dirt adherent.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features: Well marked entheses of all bones.

Comments: Radiographs: left tibia.

Burial Number: 1968 - 39

Archaeological context: Middle Period 4, level V, square 3F, SE quadrant, AD 135 cm, orientation SW. Supine, extended adult skeleton, complete except for mandible and face. The skull was placed on the pelvis (?decapitated). A nest of pots was found beyond the head on a sherd sheet, an antler spatula, a clay pestle were found to the left of the skull, potsherds under the femora, ankles and feet, and another pot nest on top of the grave to the SW of the skull.

Age: 50 - 60 years (auricular surface morphology).

Sex: Female (cranial and *os coxae* morphology).

Stature: 151.5 ± 4.4 cm (4' 11¾") [right fibula].

Completeness: Moderately complete skull and infracranial skeleton. The skull is missing the maxilla, right zygoma, superior right temporal, foramen magnum area of basiocciput, and nasal bones. The mandible is missing the right condyle and the coronoid processes. The infracranial remains are missing the scapulae blades, distal ends of the radii and left ulna, right ulnar shaft, most carpals and distal hand phalanges, right patella, proximal ends of the tibiae, the left fibula except the distal end, most lower thoracic and lumbar vertebral bodies, *os pubis*, left *os ischium*, most rib bodies and sternal ends, sternum, and manubrium.

Preservation: Fair. Grey concretions of the skull cannot be removed. The teeth are brittle and are broken off at the roots. The skull was reconstructed with restoration of the large bones of the vault. There are insufficient fragments for complete restoration. There is warping of the left occipital. The infracranial remains are gracile, weathered, with loss of most cancellous bone. The long bones were reconstructed from many large fragments The vertebrae are not well preserved. There is a light blue stain on the left greater tuberosity of the femur. Many of the bones are coated with the hard grey mud and have a porcelain ring.

Additional human remains: Left ulnar shaft of an adult [not Burial 32].

Dental Pathology: Premortem loss of the mandibular right three molars and two molars on the left. Marked alveolar resorption and moderate rolled rim at the posterior sockets. Some teeth appear to be held by the tip of the root only.

Cranial Pathology: Enlarged left mental foramen, without any surrounding reactive bone. Associated with premortem loss of the molars and marked alveolar resorption and abscessing. Cranial vault thickness measurements range from 5 - 6 mm. Bilateral cribra orbitalia resembles worm tracks. Observations are complicated by concretions and a thin layer of mud.

Skeletal Pathology: Slight osteoarthritis of the appendicular and vertebral skeleton.

Noteworthy Features: Unusual right humeral trochlear facet which is extended up into the olecranon fossa on the lateral side. The basiocciput and first two cervical vertebrae were closely examined for cut marks, none noted.

Comments: Aging: Auricular surface VII 50-60; Cranial suture closure post. $\Sigma\geq2$ $\geq30.5\pm9.6$, ant. $\Sigma\geq1$ $\geq32.0\pm8.3$. Radiographs: vault, right fibula, humeri, mandible. Photographs: enlarged mental foramen, mylohyoid bridge, right double foramina, tooth loss, skull, cribra orbitalia, humerus, enlarged foramen ovale.

Burial Number: 1968 - 40

Archaeological context: Early Period 1?, level I, square 4F, middle of the square, AD 150 cm, orientation SW. Infant ribs and some arm bones present, fragile, possibly disturbed. A stone adze was found over the pelvis and a pot over the feet.

Age: Infant (0-3 years based on size).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Partial infracranial skeleton. Ribs, left humeral diaphysis missing the distal end, ?left proximal ulnar diaphysis, and other unidentified bone fragments.

Preservation: Poor. The bones are preserved *en bloc* with concretions and rock-hard dirt sticking to them. Bone color is dark brown-black and coarse in texture. There is a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments:

Burial Number: 1968 - 41

Archaeological context: Middle Period 1, level IV, square 2F/3F, north quadrant, AD 140 cm, orientation SE. Supine, extended adult skeleton, complete except for cranium, with some sherds beyond the feet (possibly from Burial 42). "Mold complex" lies 11-35 cm east of the skull, but doubtful association.

Age: 40 - 45 years (auricular surface morphology and dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 163.3 ± 4.1 cm (5' 4¼) [right bicondylar femur].

Completeness: Moderately complete skull and substantially complete skeleton. The skull is missing the occipital, left temporal, sphenoid, left nasal process, and the central and lateral incisors of both jaws. The infracranial remains are missing the scapular blades, distal ends of the left arm long limb bones, most carpals, few metacarpals, left foot except the calcaneus and talus, foot phalanges, inferior sacrum, left auricular area of the ***os coxae***, bilateral ***os pubis***, sternal rib ends and bodies.

Preservation: Good. The mandible and maxilla are well preserved, reconstructed at the midline, with black mottling of tan bone and coarse texture. The teeth are covered with concretions. The long limb bones and vertebrae were reconstructed, with completion of humeri, right femur, and left tibia. Bone color is tan, mottled with black and coarse texture. The bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Premortem loss of the maxillary left third molar with incomplete resorption of the socket. There is slight calculus on the posterior teeth, and slight rolled rim and moderate resorption in the posterior tooth sockets of both jaws. Dental wear exposes the dentin in the first molars of both jaws. The mandibular canines have a light brown stain across the lower labial crown.

Cranial Pathology: Cranial vault thickness measurements range from 7 - 10 mm.

Skeletal Pathology: Slight osteoarthritis of the appendicular and vertebral skeleton with the exception of some isolated areas of the spine. The inferior right facet of the third cervical vertebra has a small, smooth, raised area of the articular surface. There is no apparent distortion of the facet. There is a matching depressed lesion of the superior right facet of the fourth cervical vertebra, with enlargement and lipping of the facet rim. The right inferior facet of the ninth thoracic vertebra is only partially preserved but is expanded along the superior edge. The right superior facet of the tenth thoracic vertebra has moderate lipping and slight porosis of the inferior and lateral rims, suggesting a loss of vertebral disc space and resulting impingement of the articular facets.

Noteworthy Features: The left patella has a vastus facet, and a flattened, circular "facet", on the anterior medial surface. The edges are not well defined, but in silhouette, the area is definitely flattened. The tibiae and fibulae are very robust, while the upper limbs are more gracile.

Comments: The calvarium is added from the "Mold Complex" [level IV, square 2F; middle and west quadrant AD 135], because it appears to match the face recovered as Burial 41. Aging: Auricular surface V 40-45; Cranial suture closure post. Σ=6 =34.7±7.8, ant. Σ=1 =32.0±8.3. Photographs: left patella, fourth cervical and tenth thoracic vertebrae, mandible, maxilla. Radiographs: humeri, right femur, left tibia, right fibula, right radius, right ulna.

Burial Number: 1968 - 42

Archaeological context: Early Period 2?, level II, square 2F/3F, north quadrant, AD 135 cm, orientation SW. Supine, extended adult, disturbed by Burial 41, feet not excavated. The skull was disturbed and tilted to the left. Some vertebrae are displaced. A pot and stone to the right of the skull, ovid leg behind the left shoulder, carnivore jaw next to the left arm, foot of a pot and piece of limestone next to the right of pelvis.

Age: 50 - 60 years (auricular surface morphology and cranial suture fusion).

Sex: Male (cranial and infracranial morphology).

Stature: 170.0 ± 7.8 cm (5' 7½") [segment right femur].

Completeness: Moderately complete cranium and partial infracranial skeleton. The skull is missing the face, mandible, inferior occipital and left temporal. The infracranial remains include the right scapula missing the blade, right clavicular shaft, right humerus missing the head, left humeral distal end, left radius and ulna missing the distal end, bilateral proximal femoral shafts, condyle fragments, most of the left hand, few right carpals, most vertebral bodies, few ribs, and fragments of the *os coxae*.

Preservation: Fair. The cranial vault was reconstructed but there are insufficient fragments to complete restoration. There is significant breakage and weathering of the infracranial skeleton, with little possibility of reconstruction. No element is complete. Bone color is orange-tan mottled with black, with some grey dirt adherent.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 7 - 9 mm. There is a 10 x 13 mm impression of the parietal, within the lambdoidal suture, just above the asterion. The defect is smooth cortical bone. On the endocranial surface there is a raised, sharp bony spur, without evidence of reactive bone formation, which is smoothly graded into the surrounding table. Possible healed depressed skull fracture.

Skeletal Pathology: The left third metacarpal does not have a styloid process. The proximal end of the bone has two circular articular facets on the medial side, and a longer articular facet which extends from the base of the bone onto the lateral side. The capitate is not present. Moderate osteoporosis and osteophytosis of the lower lumbar vertebrae.

Noteworthy Features: The cranium is extremely robust with very large ridges at the asterion and inion, and large mastoid process. Supratrochlear spur (3 x 11 mm of cortical bone) of the right humerus. Robust infracranial skeleton as well.

Comments: Aging: Auricular surface VII 50-59; Cranial suture closure post. $\Sigma \geq 12$ $\geq 45.2 \pm 12.6$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Radiographs: skull, left posterior parietal. Photographs: temporal, inion, asterion, right humerus, femur head, third metacarpal, lumbar vertebrae.

Burial Number: 1968 - 43

Archaeological context: Middle Period 6?, level VII?, square 1E, SE quadrant, AD 75 cm, orientation W-SW. Prone(?) adult skeleton with two thirds of the bones of the upper body present, all fragile and fragmentary. The skull is crushed and the feet are missing or decayed. Two jars are near the head. Bones, stones and sherds to the left of the head may belong to this individual or another even more disturbed burial. A smashed pot, burned clay and a second skull placed over the location of the femora.

Age: 35 - 40 years (auricular surface morphology, cranial suture fusion, dental wear).

Sex: ?Female (cranial morphology and infracranial bone size).

Stature: 157.0 ± 6.2 cm (5' 1¾") [segment right femur].

Completeness: Partial skull and fragmentary infracranial skeleton. The skull includes the frontal, anterior left parietal, posterior parietals at the lambdoidal sutures, occipital at the left lambda, left temporal, left maxilla, a left zygoma fragment; and the mandible missing the right body, and the left ascending ramus and condyle. The infracranial remains include the right glenoid, distal right clavicle, right humerus missing the lateral distal end, distal end and head of the left humerus, left radius and ulna missing the distal ends, most of the right metacarpals and proximal phalanges, left ilium fragments, bilateral proximal femoral shafts, the distal right tibia, one vertebral body, four cervical arch fragments, and a few ribs.

Preservation: Poor. The frontal was reconstructed but other bones of the skull are incomplete and there are insufficient fragments for restoration. The infracranial remains are fragmentary and weathered with old breakage of all bones. Bone color is dark mottled tan, coarse texture. There is a porcelain ring but the bones appear soft, with a very dark grey mud adherent.

Additional human remains: Burial 43A

Dental Pathology: Slight wear of the posterior teeth of both jaws with dentin exposure in the anterior teeth of the mandible. Slight calculus on the posterior mandibular teeth.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 8 mm.

Skeletal Pathology: Slight osteoarthritis of the right shoulder and the right distal tibia.

Noteworthy Features: Agenesis of the left maxillary third molar.

Comments: Two individuals represented. An animal jaw fragment with teeth, two tarsals were sorted from the human remains. Aging: Auricular surface IV 35-39; Cranial suture closure post. $\sum\geq2$ $\geq30.5\pm9.6$, ant. $\sum\geq1$ $\geq32.0\pm8.3$.

Burial Number: 1968 - 43A

Archaeological context: Sorted from Burial 43.

Age: Middle-aged (dental wear).

Sex: ?Female (cranial and infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary skull and long limb bones. The skull is represented by the left posterior mandible with the third molar *in situ* and the first molar loose, the parietals at the lambdoidal suture, the occipital at the lambda, and the parietals at the bregma. Present from the infracranial skeleton are fragments of a humeral shaft (?side), bilateral femoral midshafts, and some unidentified fragments.

Preservation: Poor. Incomplete and fragmentary. The skull vault bones were sorted from the bones of Burial 43 and reconstructed for identification. Most breakage is old and edges are weathered. No complete element is present. Bone color is a mottled orange-tan and black.

Additional human remains: Burial 43.

Dental Pathology: Wear to the dentin in the first mandibular molar.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 8 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 44: level VII??, square 1E, south quadrant and middle of square, orientation SW. Only feet present in excavated area. Feet badly disturbed with bones scattered. Not found in laboratory.

Burial Number: 1968 - 45

Archaeological context: Early Period 1?, level I, square 4F, north and west quadrants, AD 185 cm, orientation NW. Adult with only legs and feet extending into excavation area. Feet flexed behind the femora. Two pots between the feet and some animal bones and teeth in the fill.

Age: Adult (epiphyseal fusion and bone size).

Sex: ?Female (infracranial bone size).

Stature: 149.4 ± 3.5 cm (4' 10¾) [right tibia].

Completeness: Incomplete legs and a few fragments of sacrum. Missing are the proximal half of the femora, fibulae ends; the left cuneiforms, navicular and first metatarsal and phalanges; the right second cuneiform and the middle and distal phalanges.

Preservation: Fair. The bones of the feet, femoral condyles, and proximal tibiae are weathered and fragile. Some reconstruction of the long limb bones was possible. The bone color is unusual in that there is little mottling of the orange-tan color. Bone texture is coarse texture and all elements have a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the distal tibiae and foot bones.

Noteworthy Features: There are asymmetric and unusual medial and anterior talar facets of the calcanea. On the left there is no anterior talar facet, while on the right the anterior facet is very small.

Comments: Radiographs: left tibia, left fibula. Photographs: calcanei.

Burial Number: 1968 - 46

Archaeological context: Early Period 2, level II, square 0F, SW quadrant, AD 135 cm, orientation N. Child with skull and trunk present but fragile and legs missing. Stone adze and clamshell on face, two pots alongside the lower left body, a clamshell on the chest, and two pots beyond the feet.

Age: 3 - 9 months (diaphyseal length and dental eruption).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and moderately complete infracranial skeleton. Identified from the skull are the temporals, frontal at the orbits, a few vault fragments, the right anterior mandible with unerupted deciduous teeth, and a fragment of the left mandible at the first molar. The infracranial skeleton includes fragments of ribs, right scapula, clavicular shafts, humeral diaphyses, proximal right ulnar diaphysis, radial diaphyses, ilia, femoral diaphyses, tibial diaphyseal fragments, and a fibular diaphysis missing the ends.

Preservation: Poor. The skull is present in a few small fragments with a hard grey concretion. No reconstruction was possible. The infracranial remains are very weathered, fragile, and have been crushed and then concreted in the dirt. Some of the ribs are preserved in the concretions. Bone color is light pink-tan with black mottling. There is no porcelain ring in these bones.

Additional human remains: None.

Dental Pathology: None noted in the unerupted deciduous right mandibular teeth.

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments: Several small disc beads near the neck and in the concretions of ribs and skull were found during cleaning.

Burial Number: 1968 - 47

Archaeological context: Middle Period 4, level V, square 3F/3E, AD 130 cm, orientation SW. Supine, extended adult skeleton with some bones of the feet missing. The cranium rolled on the side facing east, ?decapitated?, mandible in place on chest. A single pot to the left of the skull.

Age: 45 - 50 years (cranial suture fusion and auricular surface).

Sex: Male (cranial and *os coxae* morphology).

Stature: 159.9 ± 4.2 cm (5' 3") [left fibula].

Completeness: Substantially complete skull and infracranial skeleton. The skull is missing the maxilla, left zygoma, nasal bones, and body of the sphenoid. The infracranial remains are missing the proximal right humerus, right hand, most carpals of the left hand, distal radii and ulnae, right ilium, bilateral *os pubis*, ends of the right femur, proximal right tibia, right inferior calcaneus; left calcaneus, navicular and cuboid; distal foot phalanges, sacrum, and vertebrae missing two bodies and a single arch..

Preservation: Good. The cranial vault and mandible were completely restored with good result. There are insufficient fragments of the face present for complete restoration of the skull. The teeth have broken off at the roots. There is significant weathering of the epiphyses which prohibits a complete long bone length. There are few grey concretions. Bone color is tan, and orange-tan mottled black. There is a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology: Premortem loss of all of the mandibular posterior teeth. The remaining mandibular canines and premolars are very tenuously held. The left mandibular third premolar has a sloping wear pattern with the labial surface lower than the buccal surface.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 7 mm.

Skeletal Pathology: The right clavicle is present in two pieces, representing the distal and proximal halves, which "articulate" obliquely with grossly expanded, and flared ends. The medial fragment has a large sulcus at the rhomboid ligament insertion, and is longer on the anterior side, with an oblique surface of coarse and porotic cortical bone. The distal fragment includes a sharply angulated shaft at the conoid tubercle, and an oblique surface with a longer posterior edge. The two fragments fit fairly well together with an expanded, jagged, coarse, porotic join. There is a 10 mm length difference between the two clavicles, the right shorter. Probable pseudoarthrosis (non-union) of a midshaft clavicle fracture on the right, with both fragments preserved. Radiograph of the clavicle halves demonstrates extremely widened ends, coarse trabeculae throughout both segments, complete remedullarization, and an angulation of 30°. The right first rib is also affected with an osteophyte extending inferiorly at the tubercle area of the head, and a thickened superior border. Radiograph of the two first ribs demonstrates the right rib tapers at the head, the rib tubercle is not well marked, there is an oblique line of sclerotic bone across the neck, and the neck is thicker than on the left. Probable associated healed fracture of the right first rib.

The feet have moderate to marked osteoarthritic changes on certain facets. The right cuboid has a large, porotic and lipped cuneiform facet, the cuboid facet of the third cuneiform is markedly porotic, with complete loss of its normal shape. In the left foot, the second metatarsal has an elongated, lipped, inferior edge of the distal articular surface, while the fourth metatarsal has an elongated and lipped superior facet of the head. The proximal phalanx articulates perfectly and has an expanded proximal end.

Noteworthy Features: Robust skeleton. The mandible has a tubercle at the midline. Moderate paramastoid processes on the occipital. Marked lateral temporal ridges. The right tibia has very strongly marked interosseous line (raised 3 mm off the cortex and approximately 3 mm wide) and the soleal line is also raised 3 mm off the lateral border. The left tibia is not similarly marked. Radiograph of the tibiae demonstrates bilateral symmetry in cortical thickness in anterior-posterior and lateral views.

Comments: All vertebral and cranial surfaces were examined for cut marks, but none were observed. Aging: Auricular surface VI 45-49; Cranial suture closure post. $\Sigma=10$ $=39.4\pm9.16$, ant. $\Sigma=6$ $=43.4\pm10.7$. Could be older but cranial sutures are open. Radiographs: clavicle, tibia. Photographs: cranium, mandible, clavicle, feet, elbow, twelfth thoracic osteoarthritis, paramastoid processes.

Burial Number: 1968 - 48

Archaeological context: Middle Period 6, level VII, square 3E, NE quadrant, AD 95 cm, orientation W-SW. Supine adult burial with most of skull, right half of the body, pelvis and legs present. The lower half of the skull and body were removed by disturbances. A bronze lump lay to the right of the right knee, a pot beyond the probable location of the feet.

Age: 40 - 45 years (cranial suture fusion and auricular surface morphology).

Sex: Female (cranial and *os coxae* morphology).

Stature: 152.0 ± 3.0 cm (4' 11¾") [right femur].

Completeness: Partial cranium and infracranial skeleton. The cranium includes the frontal, parietals, right temporal, left temporal at the auditory meatus, anterior occipital, bilateral maxillary alveoli, and bilateral zygoma fragments. The infracranial remains include small fragments of the sternum, distal humeral fragment, proximal ulnar fragment, few rib body fragments, left metacarpals and proximal and middle phalanges, complete right femur, left femur missing the head, proximal right tibia and fibula fragments, left tibial shaft fragment, bilateral *os coxae* at the auricular surface and ischium, and a few lower thoracic vertebral bodies and arches.

Preservation: Fair - Poor. The cranial vault was reconstructed from large fragments but there are insufficient fragments for complete restoration of the vault or face. The right femur is complete except for weathering of the greater tuberosity and condyle, reconstructed at the midshaft. The other infracranial remains are poorly preserved fragments weathered and unable to reconstruct. Bone color is light tan with some black mottling and bone is coarse to the touch. A grey dirt adheres to many surfaces.

Additional human remains: None.

Dental Pathology: Dental wear is just beginning to expose the dentin in the maxillary molars. There is premortem loss of the maxillary left canine and lateral incisor with complete alveolar healing, and loss of the maxillary right third molar, canine and lateral incisor. A fragment of the right lateral incisor root is present in the maxillary alveolus and there is an apparent small socket for the central incisor but it is unclear if the tooth was still present.

Cranial Pathology: A small (5 x 8 mm) button osteoma, raised approximately 1 mm, is found on the right parietal near the obelion. There is a subtle mounding of the frontal in the midline with a small peak at the bregma. Cranial vault thickness measurements range from 5 - 9 mm.

Skeletal Pathology: Slight osteoarthritis of the distal femoral condyles and acetabula. Preauricular sulcus indicates childbirth.

Noteworthy Features: Third trochanter of the femur, divided anterior condylar canal, strongly marked anterior femora.

Comments: Aging: Auricular surface V 40-45; Cranial suture closure post. $\Sigma \geq 6 \geq 34.7 \pm 7.8$, ant. $\Sigma \geq 3 \geq 41.1 \pm 10.0$. Dental wear appears younger. Radiographs: right femur, maxilla. Photographs: button osteoma, *os coxae*, maxilla, anterior condylar canal.

Burial Number: 1968 - 49

Archaeological context: Middle Period 5, level VI, square 3E/4E, north quadrant, AD 105 cm, orientation NW. Supine, extended adult with some of skull, and most of upper body and feet present; the remainder was removed by disturbance. A large pot on a sherd sheet beyond the head, smashed pot beneath head and upper shoulders, sherds under pelvis and ankles and crushed pots beyond feet were also recovered.

Age: 50 - 60 years (auricular surface morphology).

Sex: Male (infracranial bone size).

Stature: Cannot be determined.

Completeness: Partial skull and infracranial skeleton. The skull includes many unidentified fragments, the maxillary molars and loose central incisors, right zygoma, left parietal at the bregma, right parietal at squamosal suture portion of the temporal, and the mandibular left molars. Infracranial remains include the scapulae at glenoid, clavicles missing the right medial end; right humerus, radius and ulna; right metacarpals and phalanges, right femoral shaft and head, proximal left femur, right fibula missing the proximal end, right distal tibia, left tibial fragment, right foot missing the distal phalanges; left foot missing the talus, calcaneus, cuboid and third cuneiform, and most phalanges; sternum, fragments of a few vertebrae, ischium and ilium fragments, sacral fragments and few rib ends.

Preservation: Poor. The skull is very fragmentary, weathered, soft and worn and there are insufficient fragments for complete reconstruction. The infracranial remains are also weathered with breakage of all bones. The right humerus and radial shaft were reconstructed. The feet are best preserved. Bone color is a mottled tan and black.

Additional human remains: None.

Dental Pathology: Premortem loss of the mandibular left first molar. Large occlusal caries on the maxillary left third molar with possible crown breakage. Slight to moderate alveolar resorption. Dental wear is slight in the molars, while dentin is exposed in the premolars. The loose maxillary central incisors are stained a blue-green on the labial and lingual crown. The stain ends slightly above the cemento-enamel junction suggesting it occurred above the gum line.

Cranial Pathology: Maximum vault thickness measurement of fragments is 6 mm.

Skeletal Pathology: Slight osteoarthritis of the feet and vertebral skeleton. The proximal right second metatarsal facet is extended proximally on the lateral side, similar to a styloid process.

Noteworthy Features: Possible deliberate (?) stain on the incisors.

Comments: Aging is difficult. There is only a small fragment of the *os coxae* at the right posterior spine and auricular surface. The auricular inferior surface is extended well beyond the edge of the bone, and is dense with small areas of macroporosity. There is coarsening of the iliac crest but no other extrusions. Aging: Auricular surface VII 50-59. The dentition does not reflect advanced age, with little wear of the premolars, but tooth loss implies old age. Photographs: maxillary incisors, left maxilla caries, right second metatarsal.

Burial Number: 1968 - 50: level VII??, square 4F: Only feet extended from baulk and were inadvertently destroyed during baulk trimming.

Burial Number: 1968 - 51

Archaeological context: Middle Period 5?, level VI, square 2E, SW quadrant, AD 95 cm, orientation N-NW. Most of grave removed by Burials 57 and 5, only legs and part of lower arm are present, feet are missing. Apparently supine. Pot sherds to the left of the surmised location of the pelvis, stone to the right of the presumed location of the right shoulder, and a sherd to the right of the ankles.

Age: 5 - 7 years (diaphyseal length of the tibia).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Partial lower infracranial skeleton. Present are fragments of the ?left ulnar and radial diaphyses, ilia, right *os ischium*, right femoral head epiphysis, bilateral femoral diaphyseal fragments, bilateral greater trochanter epiphyses, ?right patella, bilateral tibial diaphyses, and fragments of the fibular diaphyses.

Preservation: Fair - Poor. The small bones of the forearm are fragmented and unreconstructible. The left tibial diaphysis has been restored to its complete length. There are insufficient fragments for complete restoration of any of the other elements. Bone color is tan with a light grey mottling. Bone has a porcelain ring and is coarse to the touch.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 52

Archaeological context: Early Period 3, level III, square 4F/4E, AD 180 cm, orientation NW. Most of body is present but many small bones are missing and/or disarticulated. ?Partial burning. Skull upright, resting on some vertebrae, few bones of the right hand at pelvis, ribs and vertebrae scattered and disarticulated. Clamshell to the right of the head, bowl over foot bones and another pot beyond feet to the SW.

Age: 50 - 55 years (cranial suture fusion and dental wear).

Sex: ?Female (cranial morphology and infracranial measurements).

Stature: 151.6 ± 6.6 cm (4' 11¾") [segment left femur].

Completeness: Moderately complete skull and partial infracranial skeleton. The skull is missing fragments of the facial bones, sphenoid body, left occipital condyle, and the mandibular left canine alveolus. The infracranial remains include the clavicle shafts, humeral shafts missing the heads, proximal right ulna, right radial midshaft, right hamate, three hand phalanges, femoral shafts, right patella, tibial midshafts, fibulae shaft fragments, left talus and calcaneus, right navicular, few rib fragments, and a few lower thoracic and lumbar vertebral arches.

Preservation: Good - Fair. The skull is nearly complete and the vault was reconstructed, but marked concretions obscure teeth and complicate restoration of the face. The dentition is covered in concretions. The tooth enamel is cracked and broken. In the infracranial remains, the long limb bone shafts are will preserved but there are concretions and weathering of all cancellous bone. Bone color is tan with slight black mottling. There is a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology: Premortem loss of the maxillary left third molar with the socket still un-remodeled. Alveolar resorption in the maxilla exposes the tooth roots. Hypoplastic line of the crown of the maxillary lateral incisor. Dental wear is difficult to score because of concretions but at least well into the dentin in all teeth.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 10 mm. The left mandibular mental foramen is enlarged (9 x 7 mm). The edges are smooth and there is no sign of reactive bone formation. Radiograph of the left mandibular body demonstrates an obvious circular area of bone loss, the borders are sharply demarcated, and there is no sclerosis surrounding the defect. The tip of the left third premolar is visible within the defect, raising the possibility of an abscess of this tooth socket.

Skeletal Pathology: Slight osteoarthritis in the vertebrae and elbow joints. The right humerus has a well-marked deltoid tuberosity and a raised ridge-like exostosis along the superior lateral bicipital groove. The ridge is raised approximately 7 mm off the cortex. The opposite humerus is not available for comparison. Among the fibulae fragments is one with a raised exostosis along the medial border, (15 x 4 mm) of dense bone, without evidence of reactive bone formation. The exact placement of the fragment cannot be ascertained.

Noteworthy Features:

Comments: Rib and vertebral fragments (510 gm) submitted for dating by Brooks 6/72. Aging: Cranial suture closure post. $\Sigma=11$ $=39.4\pm9.1$, ant. $\Sigma=6$ $=43.4\pm10.7$. Photographs: vault, mandible, maxillary hypoplasia, right deltoid. Radiographs: mandible.

Burial Number: 1968 - 53: Pit detected but burial outside excavation area.

Burial Number: 1968 - 54: level VII??, square 4G, AD 95, orientation W or SW?: Only some bones of the upper arms encountered in recording 4/E section. Not found in laboratory.

Burial Number: 1968 - 55

Archaeological context: Middle Period 4?, level V, square 1F/2F, north quadrant, AD 130 cm, orientation SW. Only skull and right shoulder extended into excavation areas, two pots with clamshell between them and two pots and a bowl beyond skull, another pot with a clamshell inside and a pot to the right of the skull.

Age: 35 - 40 years (cranial suture fusion, dental wear, and sternal rib end).

Sex: Male (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Nearly complete skull and partial upper infracranial skeleton. The skull is missing a few fragments of the occipital around the foramen magnum, zygomatic processes of the temporal, and two maxillary teeth. The infracranial remains include the scapulae at the glenoid, clavicles, right humeral head and distal end, right proximal ulna, manubrium, right patella, a single hand phalanx, the cervical and first eight thoracic vertebrae, and a few upper rib fragments.

Preservation: Good. The bones that are present are well preserved. The skull vault was reconstructed and the face was attached with some distortion. The mandible was completely restored. There are no concretions of the skull. The clavicles and scapula were reconstructed. The vertebral bodies are well preserved, but all other bones are weathered and have concretions. Bone color is light tan mottled with black and coarse to the touch.

Additional human remains: None.

Dental Pathology: A single buccal crown caries on the mandibular left second molar. Slight calculus on most teeth with moderate levels on the anterior teeth. Dental wear exposes the dentin in the incisors and first molars of both jaws.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 10 mm. The vault has a slight bulge at the posterior right occipital. There are several small bony spurs at the level of the mandibular foramina bilaterally along the posterior interior border of the ascending ramus of the mandible. The spurs on the left side are larger and more prominent than those on the right.

Skeletal Pathology: Slight osteoarthritis in the vertebral articular facets.

Noteworthy Features: Moderately shoveled left maxillary central incisor, agenesis of the maxillary left third molar, anterior rocker jaw, moderate paracondylar process, and tympanic dehiscence.

Comments: Aging: Cranial suture closure post. Σ=4 =34.7±7.86, ant. Σ=2 =36.2.±6.2. The suture fusion suggests older age than the dental wear. Photographs: skull, mandible, tympanic dehiscence, paracondylar process. Radiographs: skull.

Burial Number: 1968 - 56

Archaeological context: Middle Period 6, level VII, square 3E, SW quadrant, AD 110 cm, orientation W-SW. Supine, extended burial, feet disturbed. A pot is located beyond the head, sherd sheet under pelvis, and ovid bone next to shoulder.

Age: 25 - 30 years (dental wear, sternal rib end, epiphyseal fusion).

Sex: Male (cranial, *os coxae* and infracranial morphology).

Stature: 158.2 ± . cm (5' 2¼") [left humerus].

Completeness: Moderately complete skull and substantially complete infracranial skeleton. The skull is missing the left mandibular gonion and incisors, the maxillary incisors, fragments of the superior maxilla, nasal bones, right frontal, anterior and inferior right parietal, right temporal, right occipital, and the sphenoid. The infracranial remains are missing the left clavicle, scapular blades, right carpals, most hand phalanges, right patella, left femoral head, left proximal tibial shaft, right proximal fibula, most of the left foot, *os pubis*, the fifth cervical vertebra, sternal rib ends, and some rib bodies.

Preservation: Good. The individual bones of the skull required reconstruction but there are insufficient fragments for complete restoration. The humeri are complete and the forearm bones were restored. The vertebrae are in good condition, there is some weathering of the foot bones, and the femoral condyles are only fairly preserved. Bone color is tan mottled black, and is fairly uniform throughout the skeleton. Porcelain ring of the bone.

Additional human remains: None.

Dental Pathology: Moderate calculus on the teeth of both jaws. Slight wear of all teeth except the third molars which have no wear. Slight alveolar resorption of the premolar sockets and slight rolled rim of the mandibular posterior sockets.

Cranial Pathology: The superior cranial vault has a pronounced fine porosis with tiny pits (0.1-0.2 mm) covering the cortex of all surfaces superior to the muscle marking lines. Healing is more advanced anteriorly than posteriorly. The cranial surface feels coarse to the touch. Cranial vault thickness measurements range from 5 - 8 mm. There is a huge paracondylar process of the right occipital. The left basiocciput is fragmented and unreconstructible. The oval-shaped process is 15 mm wide at the base and extends approximately 10 mm off of the occipital, with a coarse cortex on the end. The lateral edge of the process is higher than the medial edge. The right side of the first cervical vertebra has a corresponding enlarged and flattened extension of the costal bar to accommodate the process. In articulation the two pieces fit precisely. The left zygoma has a pronounced expansion of the cortical bone at the center of the anterior surface.

Skeletal Pathology: A small osteochondroma (4 mm, raised 2 mm) is noted on the posterior lateral shaft near the proximal metaphysis of the right tibia. The surface of the exostosis is slightly flattened and has a coarse appearance. The right radius has a raised ridge of bone on the medial surface of the anterior distal end. There is no indication of malalignment or circumferential thickening. The right ulna has an deeply impressed lateral posterior border behind the interosseous line. All of the right arm bones are larger and more strongly marked than those on the left. There is deep sulcus with thickened trabeculae at the costoclavicular insertion of the right clavicle, with an exostosis (5 x 3 mm, raised 2 mm) distal to the sulcus.

Noteworthy Features: The first sacral segment has failed to fuse in the midline, resulting in a hiatus to the middle of the second lumbar body.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 0$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Radiographs: humeri, radii, ulna. Photographs: radius, clavicle, tibia, paracondylar process, first cervical vertebra, zygoma, mandible, maxilla, porosis.

Burial Number: 1968 - 57

Archaeological context: Middle Period 6, level VII, Square 2E/2F, south quadrant, AD 115 cm, orientation W-SW. Most of the skull, right arm and left leg were removed by disturbances. A smashed pot and animal bone were found to the right of the ankles, and another pot was located beyond the feet.

Age: Adult (cranial suture fusion 30 - 35 years).

Sex: Female (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Partial cranium and infracranial skeleton. Present from the cranium are the left zygoma, left upper maxilla, frontal, right parietal, posterior left parietal, occipital at the lambda and condyle fragments, and the left temporal. The infracranial remains include the second cervical vertebra and five arch fragments, few rib fragments; bilateral humeral, radial and ulnar shaft fragments, right femoral shaft with the ends in fragments, right tibial midshaft fragment, right fibular shaft missing the proximal end, some tarsals and metatarsals of both feet, and three left metacarpals.

Preservation: Good - Poor. Incomplete and fragmentary remains. Reconstruction of the frontal and parietals was accomplished with good result, but there is insufficient material to complete the restoration. The infracranial remains are poorly preserved with no complete long limb bone. There is old breakage and weathering of all of the bones. Bone color is tan, mottled with black. The skull is mostly black. Bone texture is coarse and the bone has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Tympanic dehiscence of the left temporal. Cranial vault thickness measurements range from 6 - 8 mm.

Skeletal Pathology: None noted.

Noteworthy Features: Lambdoidal wormian bone.

Comments: Photographs: tympanic dehiscence and lambdic bone.

Burial Number: 1968 - 58

Archaeological context: Middle Period 6, level VII, Square 2E/3E, middle of square, AD 105 cm, orientation W-SW. The right arm and most of the legs were removed by disturbance. A smashed pot was found to the right of the presumed location of the legs; a pot, sherds, bronze fragment and red pigment were located to the right of the legs, and a bowl and a pot were found beyond the probable location of the feet.

Age: 35 - 40 years (auricular surface morphology).

Sex: Female (infracranial bone size and *os coxae* morphology).

Stature: 152.8 ± . cm (5' ¼") [segment left humerus].

Completeness: Fragmentary infracranial remains. Identified from the infracranial skeleton are few cervical vertebral bodies and arches, mid-thoracic vertebral bodies and arches, the tenth through the twelfth thoracic vertebrae, the five lumbar vertebrae, fragments of the sacrum, bilateral proximal clavicles, left scapula fragment at the glenoid, left humeral shaft, left radius and ulnar shafts, left femoral fragments, bilateral *os coxae* fragments, and bilateral upper rib fragments.

Preservation: Poor. Fragmentary and incomplete. There are insufficient fragments for restoration of any element. There is fresh breakage of the left femur, but all other breakage is old and weathered. The bone color is orange-tan with black mottling. The bone texture is coarse and bone has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the vertebral skeleton.

Noteworthy Features:

Comments:

Burial Number: 1968 - 59

Archaeological context: Middle Period 5, level VI, square 2E, SE quadrants, AD 110 cm, orientation N-NW. Supine, extended burial directly below Burial 51. The skull was removed by Burial 58, the right arm and trunk were removed by Burial 57 and the left shoulder was removed by a third pit. Contained sandstone and sherds under the pelvis, a pot over the feet and three additional pots beyond the feet.

Age: 20 - 25 years (epiphyseal fusion and auricular surface morphology).

Sex: Female (infracranial and *os coxae* morphology).

Stature: 154.8 ± 3.0 cm (5' 1") [right femur].

Completeness: Right mandible and moderately complete infracranial skeleton. The right mandible with two molars *in situ* and two maxillary premolars represent the skull. The infracranial remains are missing one thoracic vertebra, one cervical vertebra, most vertebral arches, the scapulae, distal left clavicle, right humerus, proximal right radius and ulna, most carpals and two metacarpals of both hands, one metatarsal, foot phalanges, all of the right ribs, most of the left ribs, and the bilateral *os pubis*.

Preservation: Good. There is weathering of all cancellous bone and both old and new breakage. The right femur and left tibia are reconstructed to their complete lengths. The vertebrae are weathered and the arches are detached. Bone color is uniformly tan, mottled black with grey dirt adherent. The bone has a porcelain ring.

Additional human remains: None

Dental Pathology: Premortem loss of the mandibular right second molar with complete healing of the alveolus. A small caries occurs on the buccal crown of the mandibular right first molar. Two loose maxillary teeth have enamel wear, while the mandibular first molar has initial exposure of the dentin.

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis in the bones of the feet.

Noteworthy Features:

Comments: Aging: Auricular surface I-II 20-29, medial clavicle on right still open. Photographs: left innominate. Radiographs: right femur, left tibia and left radius.

Burial Number: 1968 - 60

Archaeological context: Middle Period 6, level VII, square 1E, NW quadrant, AD 96 cm, orientation W-SW. The burial is supine, extended, with a crushed pot under the chest. The left hand and left foot are missing.

Age: 25 - 30 years (auricular surface morphology).

Sex: Female (cranial, *os coxae* and infracranial morphology).

Stature: 149.2 ± 2.1 cm (4' 10¾") [left bicondylar femur and tibia].

Completeness: Partial skull and moderately complete infracranial skeleton. The skull is missing the left maxilla, left zygoma, left temporal, the nasal region of the right maxilla, inferior left parietal, the occipital around the foramen magnum, the right mandibular condyle and the left coronoid. The infracranial remains are missing the ends of the forearm bones, scapular blades, proximal clavicular shafts, sternum, right hand, left carpals and two metacarpals, right patella, ends of the fibulae, most of the bones of the left foot, most of the left ribs, all sternal rib ends, the bodies of the mid-thoracic and upper lumbar vertebrae, *os pubis*, and the iliac blades.

Preservation: Fair. The cranium required reconstruction, but insufficient fragments prevented complete restoration. The teeth are well preserved. The infracranial remains are weathered, broken and only the femora and left tibia were reconstructed to length. The bone color is mottled black, mostly dark with grey dirt adherent. There is a porcelain ring to all bones.

Intrusive Human Remains: Adult mandibular central incisor with dentin exposure.

Dental Pathology: Slight calculus on most teeth. Slight resorption of the maxillary alveoli. Dental wear exposes the dentin in the anterior teeth and the first molars of both jaws. The left mandibular third molar is missing the crown. The tooth is anchored well in the alveolus, a tiny ring of enamel is present with yellowish dentin exposed in the center. The crown is completely smooth and flat. Under magnification there is evidence of vertical lines which resemble rodent gnaw marks on the dentin. Assuming post-depositional damage to this tooth. The crowns of the maxillary right incisors and the third premolar are stained purple-grey. The color of the roots of these teeth is the same as other unstained teeth. The right canine is white in color.

Cranial Pathology: Moderate paracondylar process (13 mm diameter, raised 4 mm) of the left occiput. Cranial vault thickness measurements range from 4 - 7 mm.

Skeletal Pathology: The left tibia is missing the medial malleolus and anterior plateau, and the left fibula is missing the distal end. The left tibia and fibula are circumferentially thickened at the midshafts. The tibia has a large bulging thickening of the medial shaft with coarse linear striations and some signs of porosis along the posterior border. There is the appearance of an anterior bow. The posterior border has minimal thickening right at the midline, while the lateral border has a swelling evident toward the anterior spine and the interosseous line becomes flattened and obscure near the midshaft. Rotational deformity of the tibia is difficult to evaluate with the missing malleolus, but comparison with the right side, suggests no rotation and angulation of only 10°. Radiographs in two views document complete remedullarization of the tibia, with a very slight anterior-posterior angulation (5°). In the lateral view, cortical thickening of the anterior tibial shaft extends from the tibial tuberosity across the midshaft and tapers off at approximately the proximal end of the distal third of the bone, suggesting a well healed spiral fracture of the proximal tibia. The left fibula is thickened in an anterior-posterior direction with a slight amount of expansion along the medial border. Radiograph of the left fibula also demonstrates complete remedullarization of the bone, with thickened cortices and no evidence of angulation. Probable healed fracture of the proximal third of the left fibula and tibia. Slight osteoarthritis of the foot bones and the lower thoracic and lumbar vertebrae.

Noteworthy Features: Radiograph demonstrates agenesis of the right mandibular third molar.

Comments: Aging: Auricular surface II 25-29; Cranial suture closure post. $\Sigma \geq 1$ $\geq 30.5 \pm 9.6$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Photographs: maxillary teeth, mandibular left third molar, tibiae, left fibula. Radiographs: mandible, tibiae, left fibula, femora.

Burial Number: 1968 - 61

Archaeological context: Middle Period 6, level VII, square 1E, NE quadrant, AD 90 cm, orientation W-SW. Supine, extended burial with a smashed pot under and beyond the feet, a bowl, and a pot with a long handles and a clay spoon inside, and a piece of ?turtle shell beyond the feet.

Age: Old (50 - 60 years (tooth loss).

Sex: Male (cranial morphology).

Stature: 163.1 ± 7.8 cm (5 '4¼") [segment right femur].

Completeness: Partial skull and infracranial fragments. Missing from the skull is the mid-maxilla, nasal bones, nasal processes, the basiocciput, left posterior mandibular body, and the right ascending ramus. The infracranial remains include the right distal clavicle, right scapula fragments, left distal humeral fragment, right ulnar and radial shafts missing the ends, some hand bones, bilateral proximal femora and a condyle fragment, most of the left foot, right navicular and phalanges, body and arch fragments of the cervical vertebrae, facet fragments of some thoracic and lumbar vertebrae, a small handful of rib fragments, and a large number of unidentified fragments.

Preservation: Fair - Poor. The skull is fairly well preserved, reconstruction of each of the vault bones and the vault was accomplished. Breakage in the infracranial skeleton is old and nothing could be restored. The unidentified fragments are very small and appear insufficient for the missing skeleton. Bone color is tan mottled grey and bones have a porcelain ring but a 'soft' texture.

Intrusive Human Remains: None.

Dental Pathology: The mandible and at least the anterior maxilla are completely edentulous with complete resorption of the alveoli.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 9 mm. The diplõe seems to have a lot of space between the trabeculae. There is no porosis.

Skeletal Pathology: Slight osteoarthritis of the infracranial skeleton and vertebral skeleton.

Noteworthy Features: Robust temporal.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 5$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: mandible, cranial vault thickness.

Burial Number: 1968 - 62

Archaeological context: Early Period 1, level I, square 3F, middle of the north quadrant, AD 195 cm, orientation NW. Supine, adult skeleton with the knees bent to the left and the trunk slightly disarticulated. Associated artifacts include a pot beyond the head, circular patch of discolored soil next to the right femur, a pot at the feet, boar's tusk, red pigment, and two grindstones beyond the feet.

Age: 45 - 50 years (auricular surface morphology, cranial suture fusion and dental wear).

Sex: Male (cranial, *os coxae*, and infracranial morphology).

Stature: 161.7 ± 5.1 cm (5' 3¾") [left physiological tibia].

Completeness: Moderately complete skull and infracranial skeleton. The skull is missing the right zygoma, upper maxilla and nasal processes, basiocciput, and the tip of the right coronoid process. The infracranial remains are missing the cervical vertebral arches, a couple of thoracic vertebrae, the fifth lumbar vertebra, most of the transverse and spinous processes of the vertebrae, scapular blades, humeral heads, distal clavicles, most left carpals, bilateral *os pubis*, most of the sacrum, right proximal tibia, a portion of the right femoral midshaft, a few left tarsals, and a few distal and middle phalanges.

Preservation: Good - Fair. The mandible was completely restored, but most teeth are broken off at the roots. The cranium was reconstructed but the concretions result in a fair amount of distortion. Only two complete long limb bones could be reconstructed. The ribs are fragmented into two inch pieces, no reconstruction was attempted. There is weathering and breakage of every bone. The bone is quite solid and heavy with the added stony concretions and some of the bones of the hand are preserved *en bloc*. Bone color is mottled tan, black, and orange-tan with a fairly uniform distribution over the skeleton. Porcelain ring of most bones.

Intrusive Human Remains: A maxillary canine and central incisor.

Dental Pathology: Premortem loss of the mandibular right central incisor and canine with complete resorption of the alveoli. Dental wear exposes the dentin in the first molars. Slight rolled rim and alveolar resorption of the mandibular tooth sockets.

Cranial Pathology: Cranial vault thickness measurements range from 7 - 11 mm.

Skeletal Pathology: Marked osteoarthritis of the distal facet of the bilateral first metatarsals. There is a superior lateral osteophytic extension of the distal facet of the right first metatarsal, which is raised off of the cortical surface, as well as osteophytic extension of the inferior surface of the same facet. Only the distal end of the left first metatarsal is recovered, with eburnation of the lateral side of the distal articular surface. The proximal phalanx on the right has an expanded medial proximal facet. There is slight osteoarthritis of the other bones and the vertebral skeleton.

Noteworthy Features: Retained metopic suture. Robustly marked temporal. Humeri appear very gracile and thin with small deltoid tuberosities. Septal aperture of the humerus. The patellae are heart-shaped with very pointed inferior ends and a large medial extension.

Comments: Aging: Auricular surface VI 40-49; Cranial suture closure post. Σ=13 =45.2±12.6, ant. Σ=6 =43.4±10.7. Estimate difficult because the auricular still has striae which is typically less than 40 years, but cranial suture fusion is advanced in posterior sutures. Photographs: sternal aperture, skull, mandible, tooth wear, first metatarsal. Radiographs: left tibia, skull, left ulna.

Burial Number: 1968 - 63: No skeleton in pit.

Burial Number: 1968 - 64

Archaeological context: Middle Period 1, level IV, square 0F/1F, south quadrant, AD 110 cm, orientation SW. Supine, extended burial, with disturbances at the lower right arm and right leg. A grooved sharpening stone, ovid bone, snail shells and hard red pigment were found over the knee area. The last two items may have been in the fill of the level V pit which removed the leg.

Age: 35 - 40 years (auricular and pubic symphysis morphology).

Sex: Male (cranial and *os coxae* morphology).

Stature: 162.7 ± 4.1 cm (5' 4") [left bicondylar femur].

Completeness: Substantially complete skull and moderately complete infracranial skeleton. The skull is missing the mandibular left central incisor, several maxillary teeth, the left inferior parietal, and the left sphenoid wing. The infracranial remains are missing the right ulna and radius except for the proximal ends, most of the right hand, the right femoral shaft, right patella, right tibia, fibulae, and two tarsals from each foot.

Preservation: Excellent - Good. The cranium was reconstructed with the face attached, and some distortion at the right asterion. The mandible is the best preserved element, and was completely restored. Many of the maxillary teeth have broken off at the roots and been lost. The vertebrae are well preserved. The humeri are complete, the left ulna, tibia and femur are reconstructed to their complete lengths. Some weathering of the epiphyseal bone and the left foot bones are concreted together. The left tibia has gnaw marks on the distal posterior-medial border. There is a porcelain ring to all bones and the bone color is mostly tan with some black mottling.

Intrusive Human Remains: None.

Dental Pathology: Slight alveolar resorption of the maxillary premolar sockets, slight rolled rim of the mandibular posterior sockets. There is wear to the dentin in the mandibular anterior teeth and the first molars. Slight linear horizontal pitting hypoplasia of the mandibular and maxillary canine crowns, measurements suggest physiological stress 4.0-5.0 years.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 10 mm but thickening is not grossly apparent. The vault is preserved as a unit inhibiting observation of the character of the diplöe.

Skeletal Pathology: Slight osteoarthritis in the feet and hands and the lower thoracic and lumbar facets. Only the fifth lumbar vertebral centrum exhibits osteophytosis.

Noteworthy Features: A large, complete *os inca*, which may have been bipartite, but central suture line is obliterated. Fairly robust skull with strongly marked temporals. No squatting facets. Femoral neck fossa.

Comments: Aging: Pubic symphysis McKern $\Sigma 7$ 22.4±0.99, Todd VI 30-35, Suchey III-IV 30.7±8.1-38.2±2.0; Auricular surface IV 35-39; Cranial suture closure post. $\Sigma=9$ =39.4±9.1, ant. $\Sigma=3$ =41.1±10.0. Photographs: skull, mandible, *os inca*, femoral fossa. Radiographs: cranial vault, left tibia, humeri, left ulna, left femur.

Burial Number: 1968 - 65: No skeleton in pit.

Burial Number: 1968 - 66: Pit detected but burial outside excavation area.

Burial Number: 1968 - 67

Archaeological context: Middle Period 6?, level VII, square 2E/2F, middle of the square, AD 115 cm, orientation W-SW. Supine, extended burial, with disturbance of skull, torso and right arm by Burial 68. A stone adze found at the upper left chest.

Age: 35 - 40 years (auricular surface morphology).

Sex: Male (infracranial and *os coxae* morphology).

Stature: 168.3 ± 4.1 cm (5' 6¼") [left bicondylar femur].

Completeness: Partial infracranial skeleton. Missing are the right clavicle, scapula, and all the right arm bones except the proximal ulna and a few hand bones; the left humeral head, left proximal radius, all right ribs and most left ribs, vertebrae, sacrum, most of the *os coxae*, left patella, left femoral head, left proximal fibula, and some foot phalanges.

Preservation: Fair. The left ulna, and right femur and tibia were reconstructed to complete lengths. There is weathering loss of all cancellous bone especially the proximal tibial epiphyses and femoral condyles. Bone color is predominately dark gray with some light tan mottled, bones have a coarse texture and a porcelain ring.

Intrusive Human Remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: Slight osteoarthritis of the foot bones and thoracic vertebrae. An upper thoracic vertebral arch fragment (?fourth) exhibits ridging of the inferior edge of the left superior facet. This change is consistent with a loss of intervertebral disc space and collapse of the inferior facet of the upper vertebra downward. There is an exostosis (4 x 8 mm) of the proximal right fibula, on the posterior border, at the *soleus* insertion. The exostosis is solid cortical bone with no signs of circumferential thickening, rotation, or deformity.

Noteworthy Features: Double calcaneal facets. The fibulae have well defined borders.

Comments: Aging: Auricular surface IV 35-39. Radiographs: right femur, left ulna, right fibula. Photographs: fibula, calcaneus, patellar notch.

Burial Number: 1968 - 68

Archaeological context: Middle Period 6?, level VII, square 2E/2F, east quadrant, AD 112 cm, orientation W-SW. ?Supine, extended burial represented by the mandible, upper trunk, and the lower part of the legs; the remainder of the skeleton was removed by multiple disturbances in the pelvic region. A large piece of sandstone, a buffalo mandible, and some sherds are found in the presumed foot area.

Age: 45 - 50 years (auricular surface morphology).

Sex: Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Incomplete mandible and partial infracranial skeleton. The mandible is missing the left ascending ramus, right anterior alveolus, left fourth premolar, and right canine. Present from the infracranial remains are fragments of the scapulae, clavicular and humeral shafts, few bones of both hands, femoral heads, left femoral midshaft, tibial shafts with fragments of the epiphyses, fourth through the seventh cervical vertebrae, few thoracic facet fragments, rib body fragments, bilateral ischial fragments and the right ilium at the auricular surface.

Preservation: Fair - Poor. The interior mandibular body is weathered; the teeth are well preserved with the crowns intact. No reconstruction was possible in the long limb bones due to insufficient fragments. The cancellous bone is extremely weathered. Vertebral bodies and ribs are fragmentary. Bone color is mottled tan and black, with a coarse texture, and a porcelain ring.

Intrusive Human Remains: None.

Dental Pathology: Dental wear exposes the dentin in the first mandibular molars and the anterior teeth. The teeth are loose so calculus was not scored. The bilateral mandibular third premolars have small oval facets of the buccal surface of the crown just above the cemento-enamel junction. The dentin is exposed in both teeth and is stained black along with the roots. Under magnification, a curved polishing of the enamel can be seen surrounding the exposed dentin. There is no wear of the adjacent left fourth premolar crown. The left mandibular canine has evidence of polishing of the lower crown, surrounded by a ring of very slight enamel wear.

Cranial Pathology: There is a semi-circular impression defect of the posterior right mandibular condyle. The bottom of the defect is smooth cortical bone.

Skeletal Pathology: Slight osteoarthritis in the vertebral skeleton and distal tibiae.

Noteworthy Features: Small, gracile bones.

Comments: Excavator states "young adult" but tooth wear more like middle-aged. Aging: Auricular surface VI 45-49. Rechecked age twice and fluctuated between 40 - 45 and 45 - 50 years. Photographs: mandible, tooth wear, premolar facets.

Burial Number: 1968 - 69

Archaeological context: Middle Period 6?, level VII, square 2E/2F, east quadrant, AD 115 cm, orientation W-SW. Only the legs present, the remainder of the burial removed by Burial 60 and later disturbances in the foot region. One half of a pot next to the pelvis, a small stone and sherd sherds in the area of the feet.

Age: Adult (fusion of proximal femur).

Sex: ?Female (femoral head measurement 38 mm).

Stature: 147.7 ± 5.2 cm (4' 10¼") [segment right femur].

Completeness: Fragmentary infracranial skeleton. The right femur missing the condyles, right clavicular shaft, and a distal fragment of the left femoral shaft.

Preservation: Fair. The right femur was reconstructed. There are no additional bone fragments. Bone color is mottled black and tan. The bone has a porcelain ring and bone texture is coarse.

Intrusive Human Remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: A bag labelled "Bones NW ?69" contained the clavicle and femoral shaft fragment.

Burial Number: 1968 - 70

Archaeological context: Middle Period 6?, level VII, square 2E, NW quadrants, AD 110 cm, orientation W-SW. Supine extended skeleton with the skull originally propped on pots. Only the skull, pelvis and some trunk is present. All fragmentary and fragile. Two pots behind and lightly under skull.

Age: 50 - 60 years (auricular surface and dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: Cannot be determined.

Completeness: Partial skull and fragmentary infracranial skeleton. The skull is missing the left maxilla, left zygoma, inferior frontal, fragments of the parietals, sphenoid body, a fragment of the mandibular body at the right premolars, and most teeth. The infracranial remains include left scapular fragments, clavicle shafts, fragments of the right radius, ulna and humerus; some of the right hand, bilateral femoral heads, five rib heads, some cervical and thoracic vertebrae, and a fragment of the left ischium and ilium.

Preservation: Good - Poor. The cranial vault bones are well preserved with little weathering, but reconstruction was limited by insufficient bone fragments. The mandible was reconstructed. The infracranial remains are mottled black and orange-tan, and weathered. Little cancellous bone is preserved and no reconstruction was possible.

Intrusive Human Remains: Fetal remains sorted from the fragments [see Burial 70A].

Dental Pathology: Moderate to marked alveolar resorption in the posterior maxillary and mandibular sockets. Slight rolled rim of the mandibular molar sockets. Dental wear exposes the dentin in most teeth and the pulp in the maxillary first molar.

Cranial Pathology: Slight, nearly healed, fine porosis of the cranial vault at the bregma. Cranial vault thickness measurements range from 6 - 8 mm.

Skeletal Pathology: Slight osteoarthritis of the upper thoracic and cervical facets. Slight lipping of the mandibular fossa of the occipital.

Noteworthy Features: Supraclavicular foramen in the left clavicle. Very large hand bones. Double anterior condylar canal. Partial anterior rocker jaw.

Comments: Aging: Auricular surface VII 50-59; Cranial suture closure post. $\Sigma \geq 4$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: left clavicle, double anterior condylar canal.

Burial Number: 1968 - 70A

Archaeological context: Sorted from Burial 70. Middle Period 6, level VII, square 2E, NW quadrants, AD 110 cm, orientation W-SW.

Age: 4.5 - 5 lunar months fetus (diaphyseal length).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Humeral diaphyses and a rib fragment.

Preservation: Fair. Slight weathering damage and old breakage of the rib.

Intrusive Human Remains:

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments:

Burial Number: 1968 - 71A

Archaeological context: Middle Period 1, level IV, square 2E, NW quadrants, AD 155 cm, orientation W-SW/E-NE. The pit contains two individuals. The skull and upper body of one (71A) and the skull and arm bones of another (71B). Four pots and sherds from one or more smashed pots found 20 - 30 cm above the skull of 71A. Sherds and two pots found to the NE above the level of the burial. At the level of the burial, three pots found near the skull of 71B and three pots near the 71B skull and several animal bones and teeth among the bones.

Age: 35 - 40 years (cranial suture fusion and dental wear).

Sex: Female (cranial and infracranial morphology).

Stature: 148.6 ± . cm (4' 10½") [right humerus].

Completeness: Moderately complete skull and partial upper infracranial skeleton. The skull is missing the nasal processes, nasal bones, medial supraorbital region of the frontal, inferior occipital, and sphenoid body. The infracranial remains include bilateral scapulae at the glenoid, clavicles missing the distal ends, humeri; radii, the left missing the distal end and the right missing the midshaft, ulnae, some right metacarpals and phalanges, a few fibular shaft fragments, the first six cervical vertebrae, fragments of the first seven thoracic vertebrae, two lumbar vertebrae, and a few rib fragments.

Preservation: Excellent - Good. The mandible was reconstructed at the midline and is complete. The cranial vault was restored but the face could not be attached. The infracranial remains required reconstruction but restoration was complicated by insufficient bone fragments. The right humerus and ulna are restored to complete lengths. Dirt in all of the long limb bones has hardened into stone. The bone color is dark brown with some areas of tan mottling. Bone texture is smooth. There is a porcelain ring of all bones.

Intrusive Human Remains:

Dental Pathology: Slight rolled rim of the mandibular posterior sockets. Slight alveolar resorption of the maxillary tooth sockets. Dental wear exposes the dentin in the first molars and the anterior teeth of both jaws.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 9 mm.

Skeletal Pathology: Slight osteoarthritis of the radii and ulnar articular facets and the metacarpals. The first cervical vertebra is missing the left foramen transversarium and the posterior arch is quite thin. The right superior facet is double, with a very small anterior facet which extends toward the midline. In the anterior view the right superior facet is elevated above that on the left at the site of the small anterior facet, while the two inferior facets appear identical in size and shape. The first cervical vertebra articulates well with the second cervical vertebra which is also nearly complete. There is a slight indentation of the occipital, anterior to the edge of the right condyle, which accommodates the anterior facet of the first cervical vertebra. The left clavicle has a large osteophytic spur at the site of the costo-clavicular ligament insertion. The spur extends posteriorly and slightly inferiorly. There is no sign of thickening or fracture.

Noteworthy Features: Maxillary left third molar agenesis. The cranium appears short and broad.

Comments: Aging: Cranial suture closure post. $\sum\geq3$ $\geq34.7\pm7.8$, ant. $\sum\geq=1$ $\geq=32.0\pm8.3$.
Radiographs: right humerus. Photographs: skull, mandible, teeth, first cervical vertebra and occipital.

Burial Number: 1968 - 71B

Archaeological context: Middle Period 1, level IV, square 2E, NW quadrants, AD 155 cm, orientation W-SW/E-NE. The pit contains two individuals. The skull and upper body of one (71A) and the skull and arm bones of another (71B). Four pots and sherds from one or more smashed pots found 20 - 30 cm above the skull of 71A. Sherds and two pots found to the NE above the level of the burial. At the level of the burial, three pots found near the skull of 71B and three pots near the 71B skull and several animal bones and teeth among the bones.

Age: Middle-aged (cranial suture fusion and dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 162.4 ± . cm (5' 4") [left humerus].

Completeness: Partial skull and fragmentary infracranial skeleton. The skull is missing the maxilla, all maxillary teeth, zygomatic processes, left occipital condyle, sphenoid body, portions of the temporals and the right mandibular condyle. The infracranial remains include the proximal left clavicle, left humerus missing the medial head, right distal humeral shaft fragment, proximal right radius missing the head; first, second and ?sixth cervical vertebrae, and two thoracic vertebrae.

Preservation: Fair. Incomplete and fragmentary. The frontal, parietals and occipital were reconstructed, but the temporals could not be attached. The mandible was reconstructed at the midline. There are concretions on the temporals, and these bone are very weathered. The left humerus was reconstructed to its complete length. Bone color is tan with a porcelain ring and some grey-black mottling.

Intrusive Human Remains:

Dental Pathology: Premortem loss of the mandibular left second and third molars, and the right second molar. Huge caries has destroyed the crown of the mandibular left first molar. Dental wear exposes the pulp in the incisors and the dentin in all other teeth.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 9 mm. The outer surface of the vault appears slightly irregular but is cortical bone.

Skeletal Pathology: Slight osteoarthritis of the vertebral facets with moderate lipping of the fifth cervical vertebral body.

Noteworthy Features: One large lambdoidal wormian bone.

Comments: Photographs: mandible, caries, wormian bone. Radiographs: left humerus.

Burial Number: 1968 - 72

Archaeological context: Early Period 1?, level I?, square 4H, middle of square and SW quadrants, AD 135 cm, orientation S-SW. The skull and part of the upper body of a child are present. The skull was face down with some hand bones below it. Maybe secondary burial contemporaneous with Burial 14.

Age: 3 - 4 years (dental eruption).

Sex: ?Male (mandibular morphology).

Stature: Cannot be determined.

Completeness: Incomplete skull. The mandible is missing the left coronoid process and a portion of the posterior alveolus. The cranium is missing the occipital, the inferior parietals and left anterior parietals, and the left anterior occipital.

Preservation: Fair. The mandible and frontal were reconstructed, but there are insufficient fragments to restore the remainder of the skull. Some concretions in the auditory meati and sinus and on the mandibular condyle. Bone color is light tan, mottled with black, and with grey dirt adherent.

Intrusive Human Remains: None.

Dental Pathology: Dentin is exposed in the deciduous incisors of both jaws, and enamel wear of all other teeth.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 3 mm.

Skeletal Pathology:

Noteworthy Features: Carabelli's cusps in the maxillary deciduous second molars.

Comments: These remains were intrusive in Burial 14, and are compatible with the excavator's description of Burial 72, supported by personal communication Bayard (1995). Written on the bag: "square 4H, 9 , Burial 14A belonging to skull B Bones F (DR 15)". Radiographs: mandible.

Burial Number: 1968 - 73

Archaeological context: Middle Period 1?, level IV, square 3E, east quadrant, AD 125 cm, orientation W- SW. Only the left hand, lower left corner of the pelvis and legs extend into excavation area.

Age: Adult (infracranial bone size and fusion).

Sex: Male (femoral head diameter 47 mm).

Stature: Cannot be determined.

Completeness: Skull fragments and partial infracranial skeleton. Present from the skull are.large fragments of the right frontal and left posterior parietal, eight other cranial vault fragments, and the left mandible half with the molars and fourth premolar *in situ*. The infracranial remains include the left femur missing the distal end, right femoral shaft, left metacarpals and few proximal phalanges, right patella, tibiae midshafts, and fragments of the anterior left ilium and ischium.

Preservation: Fair. No reconstruction of the skull was possible. There is old breakage of the long limb bone shafts, and poor preservation of the cancellous bone: only the left femoral head is present of all epiphyseal bone. The cranial bones have a porcelain ring, with a dark orange-tan color with black mottling. Infracranial bone color is dark black and tan, mottled, mostly dark, with a coarse texture and porcelain ring.

Intrusive Human Remains: Skull fragments of another male (see Burial 73A), and a few small bone fragments of another infracranial skeleton.

Dental Pathology: Slight calculus on the left posterior mandibular teeth and alveolar resorption of the same sockets. Dental wear exposes the dentin in the fourth premolar and first molar.

Cranial Pathology: Cranial vault thickness measurements 8 - 9 mm.

Skeletal Pathology: Slight osteoarthritis of the hands.

Noteworthy Features: Large male skeleton.

Comments: There are skull fragments from two individuals, both are males: since it is impossible to know which represents the original burial, I have arbitrarily assigned 73A fragments here. Photographs: frontal bone thickening.

Burial Number: 1968 - 73A

Archaeological context: Sorted from Burial 73.

Age: Middle-aged (cranial bone size and dental wear).

Sex: ?Male (cranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary skull and few infracranial bone fragments. The skull is represented by a large fragment of the left frontal, left maxilla with teeth *in situ*, and the left mandible with teeth *in situ* and missing the tip of the coronoid process and the condyle. The infracranial remains include the left side of the first cervical vertebra, a lower thoracic vertebral arch fragment, the proximal right clavicle and four rib fragments.

Preservation: Fair. The frontal fragment is light tan with very slight mottling. The mandible is orange-tan with black mottling. The mandible and maxilla are a good fit. No reconstruction possible of the infracranial material.

Intrusive Human Remains: Burial 73.

Dental Pathology: Premortem loss of the left mandibular first molar with incomplete healing of the abscessed socket, and the left maxillary third molar with complete alveolar resorption. There is slight to moderate calculus and wear to the pulp in the anterior teeth of both jaws. Slight alveolar resorption in both jaws. There is an interproximal caries on the left mandibular canine.

Cranial Pathology: There is a large ovoid (8 x 15 mm) defect of the interior left mandibular body, inferior to the mylohyoid groove, and posterior to the third molar. The defect occurs just above the inferior border and intersects the mylohyoid groove on its superior margin. The edges of the defect are smooth, cortical bone with a small amount of coarse trabecular bone evident in the bottom of the defect. Depth is about 6 mm. There is no active bone formation surrounding the defect. Possible Staphne's defect, periodontal cyst, or non-odontogenic cyst.

Skeletal Pathology:

Noteworthy Features:

Comments: There are skull fragments from two individuals, both are males, since it is impossible to know which represents the original burial, I have arbitrarily assigned 73B fragments here.
Photographs: mandible.

Burial Number: 1968 - 74

Archaeological context: Middle Period 1, level IV, square 1E, NW quadrants, AD 115 cm, orientation of the pit is N-NW/S-SE. Most bones of a single adult are present. The skull was found in the corner of the pit, the humerus and mandible in the southeast corner and the legs parallel in the center. Three pots, a bowl, and a sherd sheet underlying them, were found at the southeast end of the pit. Toward the other end, a stone adze, bone aul or fish gorge, and a piece of stone were found.

Age: 17 - 22 years (epiphyseal fusion, auricular surface morphology).

Sex: Female (cranial and *os coxae* morphology).

Stature: Cannot be determined.

Completeness: Nearly complete skull and moderately complete infracranial skeleton. The skull is missing a few fragments of the right face, zygomatic processes, right occipital condyle, three maxillary and four mandibular teeth, and some fragments of the interior left mandible. The infracranial remains are missing the right radius, right proximal ulna, humeral heads, some of the hand bones, *os pubis*, right patella, ends of the fibulae; left talus, navicular and cuneiforms; the right second metatarsal, phalanges of both feet, most of the ribs, one cervical and two thoracic vertebrae, and most of the sacrum.

Preservation: Good - Fair. The skull was reconstructed with restoration of the mandible and the face to the cranium. Reconstruction of the long limb bones restores the right femur and left forearm bones. The infracranial bone is weathered with most spinous processes of the vertebrae and cancellous bone eroded and lost. Bone color is black/brown with some tan mottling. The bones have a porcelain ring and are covered in grey dirt.

Intrusive Human Remains: None.

Dental Pathology: Premortem loss of the right maxillary incisors, canine and third premolar. Two tiny root fragments remain *in situ* at the canine and lateral incisor positions. Possible tooth evulsion? Moderate calculus on the posterior teeth and slight alveolar resorption of the posterior sockets. Dental wear is of the enamel in all teeth. The third molars have not reached occlusal surface. There is a light brown stain on the occlusal surfaces of the maxillary left first molar and canine, and the mandibular left second molar. The mandibular canines have very coarse enamel on the lower part of the labial crown.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 8 mm. Coarse porosis of the temporal at the auditory meatus on the right side.

Skeletal Pathology: None noted.

Noteworthy Features: Lambdic wormian bone, frontal grooves. Large preauricular sulci but the sciatic notch is narrow. Sternal aperture.

Comments: Aging: Auricular surface I 20-24; thoracic vertebral rims open, medial clavicle open. In the laboratory the skeletal remains labelled "Burial 75" are actually part of Burial 74 and are recorded here, but were not physically moved. The remains include the left eleventh rib, left patella, left fibular shaft, left calcaneus, cuboid, first through fifth metatarsals, right third through the fifth metatarsals, cuneiforms, navicular, left second metacarpal and one hand phalanx. Radiographs: right femur, left ulna, left radius. Photographs: sternum, skull, tooth wear, lambdic bone, premortem tooth loss.

Burial Number: 1968 -75

Archaeological context: Middle Period 1?, level IV, square 1E/1F, west quadrant, AD 120 years, orientation NW?. Only some bones of the legs and feet are present, while the remainder of the burial was removed by Burial 85. Two pots near the probable location of the feet.

Age: 20 - 25 years (clavicle and vertebral rims unfused).

Sex: ?Female (clavicle length and mandibular size).

Stature: Cannot be determined.

Completeness: Fragmentary skull and infracranial skeleton. Present from the skull are the right occipital at the lambdoidal suture, right maxilla from the first incisor to the second molar, and the right mandible missing the condyle and extending to the left first molar socket. Present from the infracranial skeleton are the left clavicle, left scapula at the glenoid, left proximal humerus, left ulnar shaft fragments, left radius missing the tubercle and head, a hand phalanx, two long bone shaft fragments, upper rib fragments, five vertebral bodies and five arches, left proximal fifth metatarsal, a metatarsal shaft fragment, right proximal third metatarsal, right first cuneiform, fragment of the right second cuneiform, and the right cuboid.

Preservation: Fair - Poor. The teeth are well preserved. The remainder of the bone is fragmentary and incomplete. No reconstruction was possible. Bone color is tan, mottled with black and with a grey dirt adherent.

Intrusive Human Remains: None.

Dental Pathology: Slight alveolar resorption and rolled rim at the right posterior tooth sockets. Dental wear exposes the dentin in the first molar of both jaws.

Cranial Pathology: None noted.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Bags #1428S and 1429S: NP7 square 1E/1F level 6B associated here (Personal communication Bayard 1995), but remain in the miscellaneous box in the laboratory. The left arm and foot remains were found to be intrusive in Burial 85 and are still there in the laboratory. Aging: the medial clavicle and vertebral rim epiphyses are open.

Burial Number: 1968 - 76

Archaeological context: Middle Period 1?, level IV?, square 1E, SE quadrant, AD 105 cm, orientation ?N. Only the skull, clavicles and upper ends of the humeri are in the excavated area. The burial is supine, skull disturbed. One pot beyond head, a doubtfully associated grindstone and a second piece of unworked sandstone to the right of skull.

Age: 35 - 40 years (cranial suture fusion and dental wear).

Sex: ?Male (infracranial bone morphology).

Stature: 162.7 ± . cm (5' 4") [right humerus].

Completeness: Partial cranium and infracranial skeleton. The cranium includes the intact calotte, three loose maxillary teeth, left mastoid, and nasal processes of the maxilla. The infracranial skeleton includes the clavicles, the left missing the distal end; scapulae fragments, right humerus with the head detached, first ribs and a few axial rib fragments, and five upper thoracic vertebral arches and bodies.

Preservation: Fair. No reconstruction of the cranium was possible. Bone is very weathered. The humerus is nearly complete and the clavicles were reconstructed, but further restoration prevented by insufficient bone fragments. Bone color is a light tan with coarse texture and porcelain ring.

Additional human remains: None.

Dental Pathology: Wear exposes the dentin in the maxillary central and lateral incisors but not the premolar. Slight to moderate calculus on these teeth. There is a notch in the occlusal surface of the maxillary central incisor.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 10 mm. There is a button osteoma (7 x 7 mm) at the midline of the upper frontal.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Aging: Cranial suture closure post. $\Sigma \geq 4$ $\geq 34.7 \pm 7.8$ ant. $\Sigma \geq 0$ $\geq 32.0 \pm 9.6$. Photographs: button osteoma. Radiographs: right humerus, ulna and radius.

Burial Number: 1968 -77

Archaeological context: Early Period 2?, level II?, square 2F/3F, north quadrant, AD 145 cm, orientation W. Infant or small child. Only the legs, part of the pelvis and the feet are present, all fragile, badly disturbed by Burial 42. A stone over the probably location of the left side of the pelvis and a pot to the right of the legs.

Age: Child (0 - 5 years, comparison of femoral diaphyseal lengths).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary infracranial skeleton. A handful of bone fragments including two long limb bone shaft fragments (?femora) and several vertebral body fragments.

Preservation: Poor. Only the two long bone shafts can be identified. Other bones are weathered fragments of cancellous bone which could not be identified. The bones are badly crushed and distorted. Bone color is dark black/brown and texture is coarse.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology:

Noteworthy Features:

Comments:

Burial Number: 1968 - 78

Archaeological context: Early Period 2, level II, square 3E, middle of the east quadrant, AD 155 cm, orientation N-NW. Supine, extended burial with disturbance of the head and shoulders by Burial 81. The skull found at the feet of Burial 81 belongs to this burial. Associated is a stone in the fill some 30 cm above the left hand.

Age: 40 - 45 years (cranial suture fusion and auricular surface morphology).

Sex: Female (cranial and infracranial morphology).

Stature: 146.1 ± . cm (4' 9½") [right humerus].

Completeness: Nearly complete skull and partial infracranial skeleton. The skull is missing the left zygoma, left nasal process of the maxilla, right lateral frontal at the zygoma, sphenoid body, and maxillary and mandibular anterior teeth. The infracranial skeleton is missing the clavicles,scapular blades, ends of the left humerus, some carpals, *os pubis* and *os ischium*, condyles of the femora, proximal tibiae, most of the fibulae, all metatarsals of the left foot, distal foot phalanges, ribs, vertebrae, sternum, and manubrium.

Preservation: Good - Fair. The cranial vault was reconstructed with good result and little distortion, but the maxilla could not be attached. The basiocciput is intact. The mandible was reconstructed at the midline with complete restoration. The bone color is a uniform light tan with light grey mottling. There is a porcelain ring to most bones and a coarse texture.

Additional human remains: None.

Dental Pathology: Slight calculus on the maxillary and mandibular posterior teeth. Slight rolled rim of the mandibular alveolus. Dental attrition exposes the dentin in the first molars and barely in the second molars. There is a light brown stain on the buccal and posterior crown of the left maxillary third molar.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 8 mm.

Skeletal Pathology: Slight osteoarthritis in the articular surfaces of the hand bones. The hook of the left hamate is reduced. There is no sign of a loose fragment and no sign of reactive bone formation. Possible healed fracture of the hook of the hamate. The anterior surface of the left patella has a circular flattened area near the center. The opposite side does not have this change.

Noteworthy Features: Third trochanter of the femur. The deltoid tuberosity of the right humerus is very robust.

Comments: Rib and vertebral fragments (510 gm) submitted for dating by Brooks 6/72. Aging: Auricular surface IV 35-39; Cranial suture closure post. Σ=9 =39.4±9.1, ant. Σ=3 =41.1±10.0. Radiographs: right humerus, radius, ulna and skull. Photographs: hamates, skull.

Burial Number: 1968 - 79

Archaeological context: Early Period 3, level III, square 3E/4E, SW quadrants, AD 165 cm, orientation NW. Supine, extended adolescent skeleton. Snail shells, human fibula and vertebrae adjoining cranium (Burial 107), human tibia beyond skull (?Burial 10), ovid legs adjoining upper arm, ground pebble at left shoulder, one pot on abdomen, a pot above the feet, and a pot beyond the feet.

Age: 18 - 23 years (epiphyseal fusion, auricular surface morphology).

Sex: Female (cranial and *os coxae* morphology).

Stature: 150.1 ± 2.1 cm (4' 11") [left bicondylar femur and tibia].

Completeness: Substantially complete skull and infracranial skeleton. The skull is missing the right nasal process of the maxilla, anterior teeth of both jaws, few fragments of the sphenoid body, and anterior occipital. The infracranial skeleton is missing the scapular blades, a midshaft fragment of the left ulna, hand phalanges and some carpals, patellae, bilateral *os pubis*, middle and distal foot phalanges, and the sternal rib ends.

Preservation: Good. Reconstruction of the cranial vault was complicated by severe concretions on the posterior cranium and temporals. The face could not be restored to the vault. The mandible is completely restored. Reconstruction of all long limb bones accomplished, but the vertebrae were not restored. Some weathering loss of the cancellous bone. Bone color is light tan with black mottling and grey concretions in most bones. The bone has a porcelain ring.

Additional human remains: A proximal right humerus (?male), right tibial and fibular shaft [the tibia and fibula may belong to Burial 10 but not moved].

Dental Pathology: The maxillary left third molar is erupting and has not reached the occlusal plane. Slight calculus on the mandibular posterior teeth, and slight rolled rim in the mandibular posterior sockets. Coarse, pitted enamel occurs on the lower labial crown of the mandibular canines. Wear has just exposed the dentin in the first molars and the incisors of both jaws. There are light brown-yellow stains of all surfaces of the maxillary tooth crowns, greater on the lingual side. The erupting maxillary left third molar crown is colored white. There is a light brown stain on the occlusal and labial surfaces of the mandibular anterior teeth, while the left lateral incisor is colored brown.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 9 mm. The orbits appear to have healed cribra orbitalia, not raised, small fine porosis and worm trails.

Skeletal Pathology: Slight lipping of the articular facets of the hand and foot bones.

Noteworthy Features: Third trochanter of the femora.

Comments: Aging: Auricular surface I 20-24. Partial union of the lumbar vertebral rims, medial clavicle epiphysis still open. Photographs: dental staining, third trochanter, cribra orbitalia. Radiographs: humeri, femora, tibiae, right fibula, radii, vault.

Burial Number: 1968 - 80

Archaeological context: Middle Period 4?, level V?, square 3E, SW quadrants, AD 115 cm, orientation W-SW. Only feet and ankles extend into excavation area. There are no grave goods encountered. Possibility that this burial may derive from level VII, but it seems from its depth and foot position to be a V burial.

Age: 13 - 16 years (epiphyseal fusion).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Incomplete lower infracranial skeleton. Present are seven rib fragments, a vertebral body and arch fragment, sacrum fragments, the greater tuberosity epiphysis; bilateral tibial diaphyses, the left with the distal epiphysis; bilateral fibular diaphyses, the left with the distal epiphysis; bilateral foot bones missing a few cuneiforms and the medial and distal phalanges.

Preservation: Fair. The left tibial and fibular diaphyses were reconstructed. There is considerable weathering of the foot bones, cortical loss and cancellous bone exposure. Bone color is tan mottled with black. Most bones have a porcelain ring and grey-brown dirt adherent. The foot bones are soft and fragile.

Additional human remains: ?Central maxillary incisors (they are a pair with shovel shaping and dentin exposed) and two small cranial vault fragments.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Radiographs: left tibia, fibulae.

Burial Number: 1968 - 81

Archaeological context: Early Period 3, level III, square 3E, NE quadrant, AD 165 cm, orientation SW. Supine, extended skeleton of a child, with two pots beyond the head. Bones and skull of Burial 78 placed beyond the feet. Large pot in fill 20 - 40 cm above the left side of the skull.

Age: 3 - 4 years (diaphyseal length and dental eruption).

Sex: ?Female (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Partial skull and substantially complete infracranial skeleton. The skull is missing the right zygoma, portions of the sphenoid body, left parietal, superior temporals, and mandibular teeth. The infracranial skeleton is missing the right clavicle, scapulae, bones of the hands, *os pubis*, *os ischium*, portions of the right *os ilium*, ends of the fibular diaphyses, most metatarsals, most thoracic and lumbar vertebral bodies, and sacrum.

Preservation: Good. The bones of the cranium were reconstructed but the face could not be restored to the vault. The mandible could not be restored because of insufficient fragments. The diaphyses were completely restored. Most of the vertebral arches are preserved, as are the ribs. The bone color is a smooth blackened-yellow brown with some mottled reddish brown. Porcelain ring in all bones. There are few additional bone fragments.

Additional human remains: Adult second cervical vertebra, left clavicle missing the distal end, left proximal humeral shaft at the deltoid, and a few rib fragments. [Clavicle and second cervical vertebra could go with Burial 78 but the humerus is duplicated - not moved].

Dental Pathology: Wear of the deciduous teeth is of the enamel only. There is a light brown stain on the buccal and labial surface of the maxillary deciduous first and second molar crowns. The unerupted permanent tooth crowns are stained brown.

Cranial Pathology: Cranial vault thickness measurements range from 3 - 4 mm.

Skeletal Pathology: None noted.

Noteworthy Features: The first cervical anterior epiphysis is not yet fused. The maxilla appears very flattened.

Comments: Photographs: ilium. Radiographs: humeri, femora, tibiae, fibulae.

Burial Number: 1968 - 82

Archaeological context: Early Period 2, level II?, square 3E, north quadrant, AD 180 cm, orientation ?NW. Small child or infant, only a few bones present. One pot probably under the body, two pots and a large animal bone level with it.

Age: 12 - 18 months (dental eruption, *pars basilaris*).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and a few infracranial bones. Identified from the skull are the temporals at the petrous and mastoid, the *pars lateralis*, *pars basilaris*, fragments of the occipital, frontal and parietals, left supraorbital region, the mandibular body and left ramus. Infracranial remains include the left clavicular shaft, proximal left humeral diaphysis, three rib fragments, and a right vertebral arch fragment (?cervical).

Preservation: Poor. The cranial vault bones are broken into less than two inch pieces. Reconstruction was not attempted. All bones are weathered with edges worn and lost. The bone color is mottled black with orange-tan, with a coarse texture and porcelain ring.

Additional human remains: None.

Dental Pathology: None noted in the unerupted mandibular deciduous teeth.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 3 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Four barrel shaped shell beads were sorted from the human remains. Photographs: *pars basilaris*, *pars lateralis*.

Burial Number: 1968 - 83

Archaeological context: Early Period 1, level I, square 3E, SW quadrants, AD 180 cm, orientation NE. Supine, extended adult skeleton. The skull is crushed. An adze was recovered opposite the left shoulder, two pots next to the left knee, crushed pots near lower right leg, over femora, and under feet.

Age: 30 - 35 years (auricular surface morphology, dental wear).

Sex: Female (cranial, infracranial and *os coxae* morphology).

Stature: 150.2 ± 2.1 cm (4' 11¼") [right bicondylar femur and tibia].

Completeness: Partial skull and substantially complete infracranial skeleton. The skull is missing the sphenoid body, nasal processes of the maxilla, fragments of the temporals, and the right mandibular condyle. The infracranial skeleton is missing the scapular blades, clavicular ends, distal ulnae, distal left radius, carpals, distal hand phalanges, two right metacarpals, bilateral *os pubis*, distal left tibia, distal right fibula, left navicular, phalanges of the feet, sternal rib ends, sternum, and manubrium.

Preservation: Good - Fair. The skull vault is crushed and distorted. There are concretions in the cranial vault bones on all exposed edges and on the interior surface; reconstruction was not attempted. There is considerable crushing and "fusion" of the infracranial skeleton (e.g. left scapula, vertebrae, and first metatarsals). These elements are preserved *en bloc* and bone is splintered and distorted. Major long limb bones were restored to complete lengths. Bone is dark brown-black with brown mottling and bones have a porcelain ring. Brown dirt adherent and within all long limb bones would not wash off.

Additional human remains: None.

Dental Pathology: Slight rolled rim in the mandibular posterior sockets. Slight calculus on most teeth. Wear to the dentin in the anterior teeth. Wear of the lingual surface of the maxillary incisors. Light brown staining on all surfaces of the posterior teeth of the mandible, and the first and second molars in the maxilla.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 7 mm.

Skeletal Pathology: Slight osteoarthritis of some vertebral facets and articular surfaces of the foot bones. There are depression defects of the right femoral head and condyle. There is no apparent crushing or breakage of the bone. The anterior surface of the femoral head has a long narrow depression of the articular surface (32 x 8 mm at the widest and 3 mm at the narrowest) which follows the margin of the head. The edges flow smoothly to the floor of the defect which is also smooth. With knowledge of the defects, they can be seen as a change in contour of the femoral head on radiograph. There is no increased bone density. On the anterior lateral condyle of the right femur there is a circular depression (13 x 16 mm) of the articular surface. This defect is not visualized on radiograph. Probable healed osteochondritis dessicans, or developmental defects.

Noteworthy Features: The right femur has a very flattened proximal shaft, a third trochanter is raised about 4 mm off the cortex and about 10 mm in total length. Preauricular sulcus suggests childbirth. Although the feet are preserved *en bloc*, exposure of the first metatarsal proximal facets illustrates an accessory facet along the lateral side of the proximal shaft for articulation with the second metatarsals.

Comments: Aging: Auricular surface III 30-34. The first and second sacral bodies are still open. Photographs: first metatarsals, femoral head defect. Radiographs: left humerus, femora and right tibia.

Burial Number: 1968 - 84: Pit detected but burial outside excavation area.

Burial Number: 1968 - 85

Archaeological context: Middle Period 4, level V, square 2E, NE quadrant, AD 150 cm, orientation W-SW. Supine, extended skeleton complete from waist down, some bones of the upper body present but disturbed. Grave goods at head or at left side either not present or absent because of two later pits. Artifacts present include semi-crescent "horned" socketed bronze axe on right chest, two pots, a piece of soft red pigment, a fragment of bronze, a large slab of sandstone and five ovid legs.

Age: 45 - 50 years (auricular surface and pubic symphysis morphology).

Sex: Male (*os coxae* and infracranial morphology).

Stature: 170.8 ± 4.0 cm (5' 7¼") [left femur].

Completeness: Moderately complete infracranial skeleton. The infracranial remains are missing the left clavicle, scapulae blades, sternum, manubrium, six cervical vertebrae, three upper thoracic vertebrae, most ribs, left humerus, some bilateral carpals, bilateral first metacarpals, right patella, left fibular head, few tarsals and the middle and distal foot phalanges, inferior sacrum, and fragments of the *os coxae*.

Preservation: Good. The upper long limb bones were reconstructed, as well as the femora and tibiae which are filled with dirt. There are concretions on some of the bones, complicating reconstruction. The vertebral arches are dissociated from the bodies and are weathered. Bone color is tan with scattered mottling of the dark gray stain. Bone texture is coarse, and there is a porcelain ring.

Additional human remains: Adult right humerus missing the proximal end, left ulnar shaft, left radius missing the tubercle and head, two long bone shaft fragments, left proximal fifth metatarsal, metatarsal shaft fragment, ulnar midshaft fragment, proximal right third metatarsal, right first cuneiform, fragment of right second cuneiform, and right cuboid: All assigned to Burial 75. Subadult left humeral diaphysis missing distal end.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: All of the long limb bone entheses are well marked with coarse spicular insertions and osteophytes. The posterior iliac crest is coarsely spicular along its length, all tubercles and attachments are strongly marked. The *linea aspera* of the left femur is coarsely and irregularly edged along the medial side. At the proximal end the ridge extends 5 mm off the cortex. There is a small tubercle on the medial side of the distal femora, above the condyles. The proximal tibiae are strongly marked, with the soleal line raised 4 mm off the cortical surface, and spurring of the tibial tuberosities bilaterally. The calcanea are both spurred at the posterior border and medial tubercle inferiorly. There is a huge spur of the medial tubercle of the left calcaneus. The left fifth metatarsal has a small exostosis of the lateral border, about midshaft, which is 5 x 3 mm and raised 2 mm.

The right fourth metatarsal has an enlarged nutrient foramen of the lateral surface. There is a circular, raised area of periosteal reactive bone on the posterior-medial side of the distal left tibia. The area measures 11 x 16 mm and is raised 1 mm off the cortex. The edges are well demarcated and the bone appears coarse and disorganized, like broccoli florets, with a healing appearance. Radiograph of this lesion demonstrates it is consistent with the external cortex, with no changes in the cortex or internal morphology at that point. The lesion shows no evidence of cortical layering, rather an appearance of outward pointing trabeculae. There is a small extension of the cortex of the superior tibial metaphysis which extends inferiorly about 5 mm.

There is a moderate osteoarthritis of the proximal ulnae and distal radii. The distal ends of the radii appear flared, likely due to osteoarthritic expansion of the facet. The distal end of the right second metacarpal has a smooth-walled erosion on the lateral side of the articular surface, with a small osteophyte proximal to it. Radiograph of this metacarpal documents a cystic-like cavity of the normal head contour. There is no sclerosis, the edges of the defect are indistinct, the medullary cavity appears normal. The superior acetabular rim is thickened and irregular and is scored as slight osteoarthritis. The right facet fragment of the ?second thoracic vertebra has evidence of ridging extension of the inferior edge of the superior facet consistent with superior disc space loss. A single vertebral body fragment exhibits an overlaying of cortical bone on the anterior centrum which extends inferiorly and has a coarse and porotic interior surface. The second, third and fourth lumbar vertebrae have osteophytic lipping and coarse spicular bone formation of the anterior bodies.

Noteworthy Features: Robust and exostotic male. There are enlarged nutrient foramina of the humeral head, femoral head and condyles, suggesting increased blood flow to these regions. Radiograph of the femora demonstrate the presence of a calcific, circular, sclerotic lesion, resembling a "cheerio" with a central area of demineralization, on the left anterior femoral head. A similar lesion is seen on the right side, but is much less obvious. These lesions were not noticed in gross examination of the femora, but the symmetry of the defects suggests possible squatting facets rather than pathology.

Comments: Aging: Pubic symphysis McKern Σ14 41.0±6.22, Todd IX 45-50, Suchey V 48.1±14.6; Auricular surface VI-VII 45-60. Photographs: calcanei, second metacarpals, tibiae. Radiographs: radii, ulnae, right humerus, femora, tibiae, second metacarpal.

Burial Number: 1968 - 86

Archaeological context: Middle Period 4?, level V, square 2, 3E, F, AD 135 cm, orientation SW. Supine skeleton with left hand under pelvis. Only portions of the hands, pelvis, and right leg are present, rest removed by Burial 48 and other disturbances. Associated are a large pot over lower right leg, three pots beside and under right leg, parts of two bronze melting crucibles, flat stone, discolored earth, burnt clay, bowl and two pots beyond original location of feet.

Age: Adult (size and epiphyseal fusion).

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Incomplete infracranial skeleton. Present are fragments of the right ulnar and radial shafts, distal left ulnar fragment, two left carpals, bilateral metacarpals and phalanges, right femoral shaft, left proximal femoral shaft fragment, *os coxae* at the sciatic notch, right fibula missing the head, left fibula shaft, tibial shafts missing the ends, left first and second metatarsals and five phalanges, and right talus and calcaneus.

Preservation: Poor. All bones are weathered and most of the cancellous bone is lost. Most of the breakage is old, the right calcaneus and talus are best preserved. There are insufficient fragments for reconstruction. Bone color is dark black/brown with some light tan mottling, bone texture is coarse and remains have a porcelain ring.

Additional human remains: Near term fetal remains: right humerus, right ulna proximal, femora and some skull fragments [see Burial 86A].

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None to slight osteoarthritis of the articular surfaces of the hands and feet.

Noteworthy Features: Double calcaneal facets.

Comments: The associated fetal remains may suggest childbirth as a possible cause of death.

Burial Number: 1968 - 86A

Archaeological context: Sorted from Burial 86. Middle Period 4, level V, squares 2, 3E, F; AD 135 cm, orientation SW.

Age: 9 lunar months fetus (diaphyseal length). **Sex:** Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary cranium and infracranial skeleton. Present are six cranial vault fragments, the left humeral diaphysis, left proximal ulnar diaphysis, right femoral diaphysis, proximal left femoral diaphysis, proximal right tibial diaphysis, and distal left tibial diaphysis.

Preservation: Fair. The left humeral and right femoral diaphyses are complete. No other remains located. Association of all of these bones is not secure.

Additional human remains: Burial 86. **Dental Pathology:**

Cranial Pathology: **Skeletal Pathology:** None noted.

Comments: Radiographs: humerus, femora diaphyses.

Burial Number: 1968 - 87

Archaeological context: Early Period 2, level II, square 1E, middle of east quadrant, AD 145 cm, orientation NW. Supine skeleton with crushed skull, and hands and feet missing. One pot found beyond head and one pot beyond feet.

Age: 9 - 10 lunar months fetus (*os ilium* measurement). **Sex:** ?Female (*os ilium* morphology).

Stature: Cannot be determined.

Completeness: Fragmentary cranium and infracranial skeleton. Present from the cranium are seven vault fragments, a petrous fragment of the temporal, and a small fragment of the right occipital condyle. Infracranial remains include bilateral rib fragments, humeral diaphyseal fragments, *os ilia*, right femoral diaphysis missing the ends, distal left femoral diaphysis, bilateral tibial mid-diaphyses, a vertebral body, and five vertebral arch fragments.

Preservation: Poor. Fragmentary and incomplete. Most breakage is old. Concretions are present on all bones, inhibiting restoration. Weathering of the ends of all bones makes identification difficult. Ribs preserved *en bloc* on top of the ilia. Bone color is dark brown-black, bone texture is coarse.

Additional human remains: None. **Dental Pathology:**

Cranial Pathology: **Skeletal Pathology:** None noted.

Noteworthy Features: **Comments:**

Burial Number: 1968 - 88

Archaeological context: Early Period 2?, level II, square 2E, SW quadrants, AD 142 cm, orientation N-NE. Supine, extended adult burial, with legs, left hand and half of pelvis present, remainder removed by Burial 92 pit. Two pots found to the left of the feet.

Age: Middle-aged (cranial suture fusion).

Sex: ?Female (infracranial bone morphology).

Stature: 155.8 ± 2.1 cm (5' 1¼") [right bicondylar femur and tibia].

Completeness: Skull fragments and fragmentary infracranial skeleton. Skull fragments identified include the left mandibular condyle, two fragments of the occipital, a fragment of the parietal at the sagittal suture, a large fragment (2 inches) of either frontal at the coronal suture or parietal at the sagittal suture, a large fragment of the posterior right parietal at the asterion, and two other small vault fragments. The infracranial remains include the right distal clavicle, fragments of the distal humeral shafts, right ulnar midshaft fragment, two left carpals and a phalanx, one lumbar vertebral body with a fragment of the right upper facet, right ilium at the anterior spine, femora; tibiae, the left missing the proximal end, left fibular shaft, right calcaneus, and two foot phalanges.

Preservation: Good - Fair. The femora and right tibia are restored to complete lengths. Most breakage is old, and there is weathering of all of the cancellous bone. There are no bone fragments representing the missing elements. Bone color is mottled orange-tan and black. Bone has a coarse texture and a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 6 - 8 mm.

Skeletal Pathology: Slight osteoarthritis of the distal tibiae and right acetabulum, lipping of the anterior patella and the inferior calcaneus, and slight spurring of the calcaneal medial tubercle. Both femora have a small raised "tubercle" at the posterior medial side of the distal end above the condyle. The lumbar vertebra has slight lipping of the superior end-plate.

Noteworthy Features:

Comments: Rib and vertebral fragments (510 gm) submitted for dating by Brooks 6/72. Two skull vault fragments and the lumbar vertebra assigned here from Burial 92 [Early Period 3, level III, square 2E; south and west quadrants, AD 160 cm, orientation NE/SW], but were not physically moved in the laboratory. Radiographs: femora, right tibia.

Burial Number: 1968 - 89

Archaeological context: Early Period 2, level II, square 2E, middle of the south quadrant, AD 147 cm, orientation S-SW. Supine burial with only part of the lower chest and right arm present. The upper body was not excavated and the remainder of lower body was removed by Burial 93 pit. Animal bones found next to lower right arm and in fill of Burial 93. A piece of red sandstone and a crushed pot in the fill.

Age: 50 - 60 years (auricular surface cranial sutures, dental wear, rib end morphology).

Sex: Male (cranial and infracranial morphology).

Stature: 167.0 ± . cm (5' 5¾") [right humerus].

Completeness: Substantially complete skull and partial infracranial skeleton. The skull is missing the left zygoma, nasal bones, upper maxilla; portions of the left inferior parietal, left temporal and occiput at the *foramen magnum*; and a few teeth. The infracranial remains include the right scapula missing the vertebral border; clavicles, the left missing the distal end; right humerus, ulna, and radius; sternum, two right metacarpals, left femur missing the distal end, right proximal fibular shaft, right *os ilium*, cervical and upper thoracic vertebrae, and rib fragments.

Preservation: Good - Fair. The mandible was restored except for missing teeth. Some teeth are broken off at the roots. The skull vault bones are in good condition but smaller bones are missing. The humerus and ulna are restored to complete lengths, but there are insufficient fragments for any other reconstruction. Most of the breakage is old, and there are old gashes on some bones. The ribs are poorly preserved. Bone color is light tan with light grey mottling. Bone texture is coarse and bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: Premortem loss of the left maxillary third molar with incomplete socket resorption. Marked alveolar resorption in the mandible and maxillary posterior sockets. Moderate calculus on most teeth. Wear exposes the dentin in all teeth, including the third molar. The mandibular canines have occlusal wear surfaces which extend down the labial crown surface.

Cranial Pathology: Cranial vault thickening ranges 5 - 10 mm, with dense diplöe. The outer table of the cranial vault has a healed coarse porosity of the superior frontal, occipital, and parietals. The right orbit has large coarse perforations (1 mm) which are not coalesced and are not raised above the cortex. The right mandibular condyle has a smooth ovoid depression of the posterior articular surface which follows the long axis of the condyle. The impression is porotic and appears slightly remodeled.

Skeletal Pathology: Moderate osteoarthritis of the glenoid fossa and auricular surface, and slight osteoarthritis in the vertebrae. The second and third cervical vertebrae are fused at the body, facets, and posterior elements. The fusion is complete and solid. There is no apparent rotation or change in morphology of either element. The fused areas are smooth and solid across the joints, without extension horizontally. There are gaps posteriorly along the inferior lamina of the second cervical vertebra. Anteriorly there is apparently a layer of bone over the centra of both vertebrae and across the disc space. Radiograph of these elements demonstrates complete fusion of the bodies, pedicles, spinous processes and absence of the disc space. Probable congenital fusion.

The right scapula, including fragments of the glenoid, coracoid, a lateral and inferior border, the acromion and a small fragment of the acromion across to the spinous border, exhibits a healed perforation of the blade in the middle of a depressed area. There is a small fold of cortical bone below the suprascapular notch and behind the glenoid fossa. The fold is approximately 2 mm deep. Radiograph of this lesion demonstrates a small circular area of bone loss, the margins are sharp, there is no sclerosis. The defect occurs in the thickest portion of the scapula, no other abnormality is visible. Possible healed puncture wound.

Noteworthy Features: Large clavicles, large third trochanter on the left femur, suprascapular notch. The anterior mandible has a rocker jaw morphology.

Comments: Aging: Auricular surface VII 50-60; Sternal rib end VI 50.0±11.17; Cranial suture closure post. Σ=7 =39.4±9.1, ant. Σ=5 =41.1±10.0. Photographs: Second cervical vertebra, mandibular alveolar resorption, scapula. Radiographs: humerus, radius, ulna, second-third cervical vertebra, scapula.

Burial Number: 1968 - 90

Archaeological context: Early Period 3, level III, square 2E, SE quadrant, AD 160 cm, orientation SE. Supine skeleton but disarticulated. The skull is shifted to the right, hands by the elbows, disarticulated trunk with vertebrae scattered. Scattered foot bones under a large pot at the feet. One pot directly beyond the skull, pig foot next to the right knee, socketed (copper) adze or digging tool on chest, shell on abdomen, sherd sheet over lower legs and feet, to the left of this a pot, pig skull and bones, beyond it two additional pots.

Age: 50 - 60 years (cranial suture fusion and dental wear).

Sex: Male (cranial and infracranial skeleton).

Stature: Cannot be determined.

Completeness: Partial skull and fragmentary infracranial skeleton. The skull is missing the upper maxilla, nasal and zygomatic processes, superior temporals, occipital at the *foramen magnum* and lambdoidal suture, the left mandibular condyle and right gonion. Infracranial remains include a scapula fragment, right clavicle midshaft, bilateral humeral midshaft fragments, left ulnar midshaft, left radial fragment, lunates, femoral heads and shafts, tibial midshafts, distal right fibula, tali and two first proximal foot phalanges, *os ilia* at the auricular surface, left ischium, few rib head fragments, first cervical vertebra, and additional fragments of seven vertebrae.

Preservation: Fair - Poor. The skull is fairly preserved with restoration of the frontal and parietals but not the basilar cranium or face. The mandible was reconstructed. The infracranial remains are poorly preserved with no complete bones, and weathering of all cancellous bone. The bone color is orange-tan mottled with black. Bone texture is coarse, and there is a porcelain ring of most elements.

Additional human remains: None.

Dental Pathology: Extreme premortem loss of the mandibular teeth. Possibly only the left incisors and canine were *in situ*, but not recovered. The left mandibular third molar socket is incompletely resorbed. The left maxillary dentition exhibits moderate alveolar resorption, moderate calculus, and wear to the dentin in all teeth. The maxillary left canine has wear to the pulp on the labial surface of the crown, with a slanted surface higher on the lingual side.

Cranial Pathology: Cranial vault thickness measurements range from 5 - 10 mm.

Skeletal Pathology: Slight osteoarthritis of the talus and vertebral facets.

Noteworthy Features: Zygomas have a "hump" in the middle, strongly marked deltoid tuberosity on the right.

Comments: Vertebrae (50 gm) submitted for dating by Brooks in 1970, rib and vertebral fragments (510 gm) submitted in 7/72, and long bone shaft fragments (20 gm) submitted in 6/5/85. Aging: Auricular surface VI-VII 45-59; Cranial suture closure post. $\Sigma \geq 14$ $\geq 45.2 \pm 12.6$, ant. $\Sigma \geq 2$ $\geq 30.5 \pm 9.6$. Photographs: edentulous mandible, maxillary canine wear.

Burial Number: 1968 - 91

Archaeological context: Early Period 1, level I, square 3E/4E, north quadrant, AD 210 cm, orientation W-NW. Infant burial with most of the upper body present, and the legs either missing or decayed. Cervid and suid bones beyond head and near right arms, two pots over probable location of feet.

Age: Fetal.

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary skull and upper infracranial skeleton. Identified only some flat bones of the vault, rib bodies, long bone shaft fragments, and two vertebral arch fragments.

Preservation: Poor. The skull fragments are in large lumps of earth and are badly fragmented, not washed but would probably disintegrate into tiny pieces. Bone color ranges from black to reddish pink. The ribs are blackened. No porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 92: See Burial 88.

Burial Number: 1968 - 93: Early Period 3, level III, square 2E; pit contains human and animal bone probably from Burial 89. Not identified in laboratory.

Burial Number: 1968 - 94

Archaeological context: Early Period 1, level I, square 3E/3F, west quadrant, AD 165 cm, orientation N-NE. Supine skeleton of a child, complete but fragile, skull crushed (probably by Burial 32). Single strand of disc beads found around neck, a stone adze over the ankles, a pot and two pieces of sandstone beyond feet.

Age: 12 - 18 months (dental eruption).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial infracranial skeleton. The skull appears to be missing the right temporal, zygomas, maxilla, *pars basilaris*, frontal at orbits, and left mandibular body. Infracranial remains include rib fragments, two vertebral arches and a single body, right scapula, right distal clavicle, right humeral diaphysis; fragments of the left humeral diaphysis, ulnar diaphyses, and right radial diaphysis; femoral diaphyses missing the distal ends, tibial diaphyses missing the distal ends, fibular diaphysis, and *os ilia* at the auricular.

Preservation: Poor. There are insufficient fragments to restore the cranium or mandible. There are no complete diaphyses and no reconstruction was possible.. Some of the ribs are preserved *en bloc*. The bones are split and exfoliating, with weathering and old breakage. Bone color is brown mottled with dark orange-tan, bone texture is coarse and bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: The right mandibular deciduous first molars are just erupting. The unerupted deciduous second molar is stained brown.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 3 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 95

Archaeological context: Middle Period 5, level VI, square 2E/3E, south quadrant, AD 95 cm, orientation N-NW. Supine burial with some ribs and right arm present, and the rest either removed by later disturbance or outside area excavated. Top of this grave removed by Burial 57. Potsherds and a large patch of charcoal under right arm.

Age: Adult (fusion of the proximal ulna).

Sex: ?Male (size of proximal ulna).

Stature: Cannot be determined.

Completeness: Fragments. The mandible at the symphysis menti, seven rib body fragments, right humerus shaft with distal end fragments, right proximal ulna, right radial midshaft fragment are recovered.

Preservation: Poor. Incomplete and fragmentary. The humerus fragments and forearm fragments were reconstructed, but there are insufficient fragments for complete restoration. There is fresh breakage of some bones, but no fragments are present. Bone color is mottled dark orange-tan with black. Texture is soft and coarse, no porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features:

Comments:

Burial Number: 1968 - 96

Archaeological context: Early Period 1?, level I, square 2E, middle of south quadrant, AD 205 cm, orientation ?NE. Apparently supine burial disturbed by the interment of Burial 93, the mandible and several ribs are excavated. Bones may have been partially burned. A shell bracelet found at right wrist region.

Age: 4 - 5 years (dental eruption).

Sex: Unknown.

Stature: Cannot be determined.

Completeness: Fragmentary skull and few infracranial bone fragments. Identified from the skull are the temporals, *pars basilaris*, *pars lateralis*, fragments of the parietal, occipital and frontal in the midline, maxilla, and a fragment of the mandible. Infracranial remains consist of the left distal clavicle, two rib fragments, and the left proximal ulnar diaphysis.

Preservation: Poor. The skull is crushed into one-inch pieces. No reconstruction possible because of insufficient fragments (*i.e.* supraorbital region, zygoma). Concretions on some of the cranial vault bones, and weathering of the edges of all fragments. Bone color is black mottled dark orange-tan, bone texture is smooth and coarse, and bone have a porcelain ring.

Additional human remains: None.

Dental Pathology: Slight calculus in the deciduous maxillary teeth. Wear just exposes the dentin in the maxillary deciduous lateral incisor and canines.

Cranial Pathology: Very slight porosis with a puffy appearance of the right maxillary palate and the interior of the occipital. Cranial vault thickness measurements range from 3 - 4 mm.

Skeletal Pathology: None noted.

Noteworthy Features: Tympanic dehiscence.

Comments: Photographs: maxilla showing porosis, tympanic dehiscence. Radiographs: Maxillary teeth.

Burial Number: 1968 - 97: Pit detected but skeleton outside excavation area.

Burial Number: 1968 - 98

Archaeological context: Middle Period 5, level VI, square 4D, west and south quadrant, AD 105 cm, orientation NNW. Supine burial with only the upper arm and ribs present. The skull is out of the excavation area and the remainder of the burial removed by later disturbances.

Age: Adult (tooth wear.)

Sex: ?Female (infracranial bone size).

Stature: Cannot be determined.

Completeness: Fragmentary skull and infracranial skeleton. Present from the skull are a fragment of the left frontal at the coronal suture, the anterior mandible and loose teeth. Present from the infracranial skeleton are the left humerus missing the head, left radius missing the bicipital tubercle, right ischium fragment, femoral shaft fragment, a vertebral body and arch fragment, and some upper left rib fragments.

Preservation: Poor. Disarticulated and fragmentary. The majority of the humeral shaft was restored, but there is fresh breakage at the proximal end. All other fragments have old breakage and are weathered. Bone color is mottled dark gray to light gray and shiny. Porcelain ring of all bones.

Additional human remains: None.

Dental Pathology: A band of very coarse enamel which is stained brown on the labial surface of the left mandibular canine, was measured and suggests physiological insult at age 4.0-4.5 and 5.0-5.5 years. Dental wear of the enamel in the mandibular left canine, premolars, and first molar. The mandibular left lateral incisor has a small blue-green stain on the upper labial crown.

Cranial Pathology: None noted.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Remains are stored as Burial M107 in the laboratory. Bag is labelled "Bag 241S NP7 4D 8 M107 Bones O, P (Dr. 5) 6-3-68". Personal communication with Bayard (1995) clarified discrepancies and assigned remains to Burial 98.

Burial Number: 1968 - 99: No skeleton in pit.

Burial Number: 1968 - 100: No skeleton in pit.

Burial Number: M101: Small mound disturbed by Burial 7 and Burial 2, no human skeletal remains.

Burial Number: 1968 - 102: Number not used.

Burial Number: 1968 - 103

Archaeological Context: Middle Period 1, level IV, square 4G, south quadrant, AD 160 cm, orientation S-SW. Extended burial with mound. Adult, complete except right hand and disturbances in the area of the lower legs, abdomen and left hand. Two pots associated beyond head and a third partly covering it. Two animal bones near left hand, a possible wood object near left ankle, dog legs and a pot near right upper body, one or two strings of disc beads at waist and large snails and a pot at feet.

Age: 40 - 45 years (cranial suture fusion, auricular surface and dental wear).

Sex: Female (cranial and *os coxae* morphology).

Stature: 148.3 ± 4.9 (4' 10½") [right humerus].

Completeness: Substantially complete skull and infracranial skeleton. The skull is missing the zygomatic processes, right occipital condyle, sphenoid body, nasal bones, right maxillary third molar, mandibular anterior teeth and a portion of the left anterior body. The infracranial remains are missing the scapular blades, sternum, most ribs, left carpals and some of the right carpals, bilateral femoral condyle fragments, left tibial plateau, proximal fibulae, smaller tarsals of the left foot, distal hand and foot phalanges, third and fourth cervical vertebrae, and the left pubic symphysis.

Preservation: Good - Fair. The cranium was previously reconstructed with fair restoration of the vault but not the basiocciput or the face. The left face was attached but restoration is still incomplete. The mandible was reconstructed. Weathering damage to most of the vertebrae, innominates, scapula and ends of the long bones, with some bones stuck together by dirt and concretions. The right humerus is complete, all other long limb bones, although reconstructed, are incomplete. Bone color is mottled orange-tan and dark grey, with brown dirt on and within all bones.

Additional human remains: None.

Dental Pathology: Premortem loss of the maxillary left third molar with partial healing of the socket. Slight alveolar resorption noted in the mandibular sockets, but maxillary sockets could not be scored. Dental attrition reaches the dentin in the molars and premolars of both jaws and exposes the pulp in the left first molars. The maxillary right lateral incisor and canine have scooped wear facets on the occlusal surface. There is no matching wear in the mandibular teeth. There is a very light brown stain on the lower crown of the maxillary incisors.

Cranial Pathology: Very well healed porosis of the right posterior cranial vault. Cranial vault thickness measurements range from 6 - 8 mm.

Skeletal Pathology: Slight osteoarthritis of the elbow and patella, and moderate changes in the vertebrae and foot bones. There is slight osteoarthritis of the proximal fourth and fifth metatarsals. Evidence of ossification of the anterior longitudinal ligament of the spine is seen in the upper and mid-thoracic vertebrae, with lipping at exactly the middle of the anterior body and a raised lump of bone in the midline of the centra. The anterior body of the second lumbar vertebra has an oblique, rectangular shaped defect from the inferior middle of the body toward the left lateral centrum. The impression is 2-3 mm deep with cracked pieces of bone at the sides. There is no evidence of healing or reactive bone. The bilateral first metatarsals have distal articular facets which are extended on the lateral side of the superior surface and the lateral side of the inferior surface. The left second metatarsal has an enlarged facet of the proximal phalanx and a strongly marked head with robust tubercles and lipping of the articular facet.

Noteworthy Features:

Comments: Aging: Auricular surface IV-V 35-44; Cranial suture closure post. Σ=7 =39.4±9.1, ant. Σ=1 =32.0±8.3. Photographs: dental filing.

Burial Number: 1968 - 104: Pit detected but burial outside excavation area.

Burial Number: 1968 - 105: Pit detected but skeleton outside excavation area.

Burial Number: 1968 - 106: level IV, square 4G/4H; some ribs and vertebrae encountered but bulk of skeleton outside excavation area. Not found in 1995.

Burial Number: 1968 - 107: Funerary offering, no skeletal remains recovered [see Burial 98].

Burial Number: 1968 - 108

Archaeological context: Middle Period 1, level IV, square 4F, middle of square, AD 125 cm, orientation N-NE. Supine, extended adult skeleton, badly disturbed by Burial 26 and later pits. Only lower arms, upper femora and innominates are present. Skull in M115 may belong to this individual. No burial goods. The mound contained three sherd sheets, bone and skull fragments, and some soft red pigment.

Age: Adult (epiphyseal fusion).

Sex: ?Female (femoral head diameter and gracile bone).

Stature: Cannot be determined.

Completeness: Fragmentary infracranial remains. Included are the left humeral shaft with detached head fragment and missing the distal end, proximal end of the left ulna, right distal radial shaft, bilateral femoral heads, left proximal femoral shaft, bilateral ischial fragments, left ilium at auricular surface, seven mid-thoracic vertebrae fragments, and a single sternal rib end.

Preservation: Poor. Incomplete disarticulated and fragmentary. No reconstruction was possible. Bone is very weathered and fragile with old breakage. Not cleaned. Bone color is light tan with some grey mottling. Bone texture is coarse and bone has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology:

Skeletal Pathology: None noted.

Noteworthy Features: Small fragment of auricular surface is present and appears flat and dense - suggesting middle age.

Comments: Elements appear to be consistent with a single individual.

Burial Number: 1968 - 109: Funerary offering with possibly empty pit extending below.

Burial Number: 1968 - 110

Archaeological context: Middle Period 1, level IV, square 3F, NW quadrants, AD 100 cm, orientation E-NE/W-SW. Most bones of an adult skeleton present, some may be been removed by later Burial 27 which caused extensive disturbance. One arm placed in SW of pit, skull to the north; ribs, other arm and vertebrae across middle of pit; legs laid in NE end of pit. Three separate sherd sheets beneath, a flat piece of sandstone between the two groups of bones (arm) and a ?chicken bone among the ribs. A pot and a bowl and a stone were found to the southeast of the burial.

Age: 35 - 40 years (cranial suture fusion, sternal rib morphology, auricular surface and dental wear).

Sex: Male (cranial and infracranial morphology).

Stature: 165.4 ± 4.1 cm (5' 5") [right bicondylar femur]

Completeness: Moderately complete skull and infracranial skeleton. Missing from the skull are the basioccipit including the foramen magnum, the temporals, sphenoid, upper maxilla, nasal bones, anterior maxillary teeth, the mandibular right ascending ramus and some anterior teeth. The infracranial skeleton is missing most of the sternum, manubrium, most sternal rib ends, left humerus, carpals, most metacarpals and phalanges, portions of the *os coxae* including the right auricular and pubes, left distal femur, most of the left tibia, left patella, mid-thoracic vertebral bodies, and a portion of the sacrum.

Preservation: Good - Fair. The cranial vault was reconstructed with fair results, but temporals and face could not be attached. Most of the maxillary teeth are repaired at the crown- root junction, while the mandibular teeth have broken off at the alveolar rim and are lost. Weathering of the foot bones, proximal tibiae, and ribs. The right humerus is complete, and the right ulna and femur are reconstructed to complete lengths. Bone color is mottled tan and black with a coarse texture and brown dirt adherent. The bones have a porcelain ring.

Additional human remains: Fragments of an occipital, left temporal, maxilla fragment and the left mandible with teeth *in situ* [possibly Burial 27].

Dental Pathology: Slight calculus on the *in situ* posterior teeth of both jaws. Slight alveolar resorption of the maxillary posterior alveolus. Dental wear of the enamel with dentin exposure in the first molars and canines of both jaws. There are light brown horizontal stains on the buccal enamel in the molars. There is a very dramatic enamel color change, along with a groove, of the left maxillary third and fourth premolars and second molar, measurement of the color change from the cemento-enamel junction suggests the defects occurred at 5.5 - 7.0 years.

Cranial Pathology: Well healed porosis of the superior posterior parietals and the superior occipital. Cranial vault thickness measurements range from 5 - 12 mm, the latter at the obelion.

Skeletal Pathology: Slight osteoarthritis of the foot and elbow with lipping of the articular surfaces. Tendon and ligament insertions are well marked on the posterior right tibia and proximal ulnae. Slight osteoarthritis of the vertebral bodies and articular facets.

Noteworthy Features: Robust male.

Comments: Aging: Auricular surface VI 45-49; Cranial suture closure post. Σ=2 =34.7±7.8, ant. Σ=0 =32.0±8.3. Labelled "A" in the laboratory, making an assumption based upon description. Also, remains in the laboratory labelled "M101" belong to this burial, but remains were not physically moved.

Burial Number: 1968 - M111

Archaeological context: Middle Period 1, level IV, square 3F, SW quadrants, AD 105 cm, orientation NW/SW. Skull and one leg of an adult present, perhaps covered with a mound..

Age: Adult (infracranial bone size).

Sex: ?Female (cranial and infracranial bone morphology).

Stature: Cannot be determined.

Completeness: Fragmentary cranium and infracranial skeleton. The cranium is represented by the temporals, portions of the left occipital, parietal and temporal at the asterion, fragments of the parietal and frontal, and the left zygoma. The infracranial remains include a right tibial shaft, fibular shaft fragments, left patella, and two metatarsal shafts.

Preservation: Poor. The cranium is crushed and fragmented with concretions covering all surfaces. Only the temporals are well preserved. The long limb bones are fragmentary and covered in concretions and unable to be reconstructed. There are no additional fragments. Bone color is grey with some orange-tan spots and a gray dirt adherent to all surfaces. Bone texture is coarse and there is a porcelain ring to all bones.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurement at the asterion is 5 mm.

Skeletal Pathology:

Noteworthy Features:

Comments: A small animal cranial vault fragment was sorted from the human remains.

Burial Number: 1968 - 112

Archaeological context: Early Period 2, level II, square 4F, west quadrant, AD 148 cm, orientation E-SE. Supine and extended child skeleton with a pot to the left of the head, a pot near the left elbow, three small adze nest to the left knee a clamshell under the right hand, pot next to the right hand, pot adjoining right knee, animal tooth on chest. Possible mound with sherd sheet, two stone bracelet segments, human finger bones and a pot. This mound may be the goods of Burial 31 because early occurrence of certain pot.

Age: 3 - 5 years (dental eruption and diaphyseal lengths).

Sex: ?Male (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Moderately complete skull and nearly complete infracranial skeleton. The skull is missing the nasal processes of the maxilla, zygomatic processes of the temporals, fragments of the superior temporals, sphenoid, right mandibular condyle. The infracranial remains are missing the distal end of the left ulna diaphysis, sternal bodies and epiphyses.

Preservation: Fair. The cranial vault was reconstructed from small fragments, but the temporals and maxilla could not be restored because of insufficient fragments. There is crushing and warping of the right frontal and missing fragments are not present. The mandible was reconstructed. There are hard concretions on portions of the vault bones and the vertebrae, ribs, left hand, left tarsals are preserved *en bloc*. There is significant weathering of all the epiphyseal bone. Most of the major diaphyses are complete or could be reconstructed to complete lengths. Bone color is light tan-black mottled.

Additional human remains: None.

Dental Pathology: Slight enamel wear of the deciduous dentition. There is a dark brown/black stain on the occlusal surface of the left mandibular molars and slight staining on the right mandibular molars, but not on the maxillary molars.

Cranial Pathology: Long headed. Reconstruction of each of the vault bones documents a premature closure of the left lambdoidal suture with complete obliteration of the suture at the middle. The opposite side is open. The suture is just barely visible endocranially and is invisible on the outer surface even with a hand lens. Probable craniosynostosis of the left lambdoidal suture. Slight healing porosity of the suprameatal area. Cranial vault thickness measurements range from 3 - 5 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: Diaphyseal lengths 3 - 4 years, *pars basilaris* 4 - 5 years. Skull reconstruction fell apart immediately. Photographs: Left lambdoidal suture.

Burial Number: 113: level III, square 0F; possibly badly disturbed burial - no skeletal remains found.

Burial Number: 1968 - 114

Archaeological context: Middle Period 1, level IV, square 1F, NE quadrant, AD 107 cm. Mound sloped slightly to south southeast. To the north, a human femur and three pots on a sherd sheet; east, animal bones, pots; west, a human skull; and to the south, a part of a large animal pelvis and sherd sheet.

Age: Late adolescent - early young adult (dental wear).

Sex: ?Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Fragmentary cranium and first two cervical vertebrae. Present from the skull are the right and left maxilla with posterior teeth *in situ*, right zygoma, right temporal and portions of the left, fragments of the occipital, parietal and frontals. The condyle of the first cervical and the second cervical vertebrae are present.

Preservation: Fair - Poor. No reconstruction of the face, and some reconstruction of the bones of the vault possible but incomplete. There is extensive weathering of the intracranial surface. The dentition is intact. Bone color is mottled dark grey with some orange-tan underneath. Bone texture is coarse. There is not a porcelain ring.

Additional human remains: None.

Dental Pathology: Small pin-point occlusal caries on the maxillary right second molar. Large occlusal caries on the maxillary left second molar. Dental wear exposes the dentin in only the maxillary right central incisor, while all other teeth have enamel wear. There is a light brown staining on the labial surfaces of the maxillary canines and right lateral incisor.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 6 mm. The floor of the auditory meati have a long narrow "V" shaped defect which extends from the margin inward toward the petrous fragment.

Skeletal Pathology:

Noteworthy Features: Unusual tympanic floor morphology with a deep "V" shaped extension from margin.

Comments: The femur is not found in 1995. Large animal metapodials; small rib, vault fragment and five small potsherds were sorted from the human skeletal remains.

Burial Number: 1968 - 115: level IV??, square 4F. Human skull and two pots which may be from Burial 108. Not identified in the laboratory in 1995.

Burial Number: 1968 - 116

Archaeological context: Middle Period 1?, level IV, square 3F, north quadrant to middle of square, AD 145 cm, orientation E-SE. Supine adult burial with only skull, left arm and left femur in excavation area. Head upright, left hand probably along pelvis. Left side has pots beside arm, pot over knee, pot over femur, pot beside ankle. The fill contained a pot 25 cm above head. Mound contained a very large pot as well as three other smaller pots.

Age: 12 - 14 years (epiphyseal fusion).

Sex: ?Female (mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial infracranial skeleton. Present from the skull are the mandible missing the left condyle, right maxilla, right temporal, left temporal fragments, bilateral parietal fragments, and occipital at the foramen magnum. The infracranial skeleton includes the left humerus missing the distal end, left femoral diaphysis and epiphyses, left tibial diaphysis, left patella, left fibular shaft; left calcaneus, talus, first cuneiform, first through third and fifth metatarsals; and the first six cervical vertebrae.

Preservation: Good - Fair. The mandible was reconstructed with good result. The cranial vault could not be restored because of crushing, warping, and concretion of the fragments. The maxillary central incisors are broken off, but otherwise the maxilla is well preserved. Many tooth crowns have been glued back to their roots. Concretions restrict dental observations. The femoral diaphysis was completely restored. The matrix has "fused" epiphyses to diaphyses, and joined the cervical vertebrae together. Bone color is a light beige mottled with black-grey. bone texture is coarse and there is a porcelain ring to the bone.

Additional human remains: A tooth crown.

Dental Pathology: Slight calculus on the maxillary teeth and slight rolled rim in the mandibular right molar sockets. Dental attrition exposes the dentin in the mandibular incisors and enamel wear in all other teeth. There is a light brown stain on the occlusal surface of the molars of both jaws and the labial surface of the lower premolars.

Cranial Pathology: Cranial vault thickness is 6 mm at asterion and 9 mm in a parietal fragment.

Skeletal Pathology: Two defects of the cortical bone on the left posterior distal femoral diaphysis, posterior-medial surface. The defects are oval in shape, follow the long axis of the bone, and occur parallel to one another. One measures 17 x 8 mm and the more lateral one is 10 x 4 mm. The bone in the bottom of the defects is coarse and there is coarse bone formation all around the defects. Probable distal cortical defects.

Noteworthy Features: Chipped left mandibular fourth premolar.

Comments: Photographs: left femur, mandible, maxillary teeth.

Burial Number: 1968 - 117

Archaeological context: Early Period 3?, level III, square 4F, west quadrant to middle of square, AD 160 cm, orientation NE. Supine, disarticulated adult. Only skull and left side of upper body in excavation area. No hand bones at distal end of radius and ulna; vertebrae, ribs, clavicles, and scapula are disarticulated. A pot, two stones and a stone adze found beyond head, and a stone over the left humerus with a fish jaw beside it. The fill contained sherds, a large piece of sandstone, and animal bone.

Age: 50+ years (cranial suture fusion >40 years, dental wear is old).

Sex: Female (cranial and infracranial morphology).

Stature: 155.1 ± . cm (5' 1") [left ulna].

Completeness: Nearly complete skull and partial upper infracranial skeleton. Missing from the skull are the supraorbital region of the frontal, nasal bones, fragments of the maxilla, occipital at the paramastoid region, sphenoid body, and styloid processes. The infracranial remains include scapulae at the glenoid, clavicle shafts, humeri missing the heads, radii, ulnae, left capitate and few metacarpals, handful of rib fragments; three cervical, nine thoracic, and two lumbar vertebral fragments; a fragment of the left inferior acetabulum, and a femoral shaft fragment (?side).

Preservation: Good - Fair. The mandible was completely reconstructed. The cranial vault was restored but the face and basiocciput could not be attached. There is warping and asymmetry because of concretions on the cranial bones. The left radius and ulna were reconstructed to complete lengths. There are insufficient fragments for further reconstruction. There is weathering of all cancellous bone and loss of the vertebral bodies and spinous processes. The bone color is light tan, mottled with grey-dark with light grey-brown concretions. The cortex beneath feels smooth.

Additional human remains: None.

Dental Pathology: Premortem loss of the mandibular third molars with complete healing of the alveoli, the maxillary second molars and the right third molar with incomplete healing of the alveolus. There is extreme wear of the mandibular incisors, with only roots remaining and pulp exposure in the canines, dentin exposure in other teeth.

Cranial Pathology: Cranial vault thickness measurements range from 6 - 10 mm. There is a coarse healed cranial porosis over the superior vault. The left mental foramen is enlarged (4 mm), without reactive bone formation.

Skeletal Pathology: A well healed fracture is present in the left lateral clavicle nearly at the conoid tubercle. The distal fragment is angulated approximately 90 degrees, apex posterior, with relatively little thickening of the bone at this point. There is no sign of damage to the acromion process. Radiograph demonstrates complete remedullarization of the clavicle, with a bridging effect from the distal fragment to the body at the anterior edge.

Noteworthy Features: Many of the mandibular teeth have cracked enamel, including the mesial and distal surfaces of the first molars, the mesial surface of the left fourth premolar and right third premolar, and the maxillary right canine. Partial rocker jaw.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 8$ $\geq 39.4 \pm 9.1$, ant. $\Sigma \geq 2$ $\geq 36.2 \pm 6.2$. Photographs: mandible, left clavicle, dental wear, tooth loss. Radiographs: clavicle.

Burial Number: 1968 - 118: Artifact assemblage which may be part of Burial 32.

Burial Number: 1968 - 119: Collection of pots. No human skeletal remains found.

Burial Number: 1968 - 120: Mound with no human skeletal remains.

Burial Number: 1968 - 121

Archaeological context: Early Period 2, level II, square 0F, middle of square to west quadrant, AD 130 cm, orientation S-SW. Supine, extended child, including most of the skull, trunk, and some of the legs present but fragile, and disturbances of the pelvic area and the. Smashed pot beyond and underneath head, bone knife to the right of head, adze to the left, circular mass of termite frass beyond head, clamshell under left hand, pot opposite right side of pelvis, string of disc beads around waist, pot over legs, two pots beyond probable location of feet.

Age: 9 - 12 months (dental eruption, *pars basilaris* and *pars lateralis* fusion).

Sex: ?Male (iliac and mandibular morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and moderately complete infracranial skeleton. Identified from the skull are the mandible, maxilla, temporals, supraorbital region of the frontal, parietals at the sagittal suture, occipital *pars*, right zygoma, and fragments of the vault. The infracranial remains include the ribs, twelve vertebral arches and three bodies, right scapula, humeral diaphyses, right radial and ulnar diaphyses, left proximal radial and ulnar diaphyses, metacarpals, partial ilium, femoral diaphyses, tibial diaphyses, and fibular diaphyses fragments.

Preservation: Fair. The cranial vault is fragmented, no reconstruction was attempted. There are complete diaphyses but ends are weathered and cancellous bone is missing, and there are insufficient fragments for the missing material. A grey-brown dirt covers all bones. Bone color is a mottled grey-black-tan. Bone texture is coarse, and bones have a porcelain ring.

Additional human remains: None.

Dental Pathology: None noted.

Cranial Pathology: Cranial vault thickness measurements range from 1 - 2 mm.

Skeletal Pathology: None noted.

Noteworthy Features:

Comments: A small flat disc bead was sorted from the human remains. Radiograph: femora, tibiae, and right humeral diaphyses.

Burial Number: 1968 - 122: Number not used.

Burial Number: 1968 - 123

Archaeological context: Middle Period 1, level IV, square 1E, SE quadrant, AD 85 cm. Half of mound removed by later disturbance. From the NE to the SW the mound contained a skull and a few human bones, a large pot, soft red pigment, two IA pots, a pig mandible and other animal bones, a piece of sandstone, all on a large sherd sheet and additional animal bones on a second sherd sheet. Possible secondary burial? but not as likely at this level.

Age: Adult (cranial suture fusion >35 years).

Sex: ?Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Partial calvarium. Present are the temporals, parietals, occipital missing the paramastoid and anterior synchondroses regions, frontal missing the supraorbital region and the right pterion region, and a fragment of the left zygoma.

Preservation: Fair. The cranial vault was reconstructed, including attachment of the temporals, with little warping. There are insufficient fragments for further restoration. Bone color is a mottled grey-black with some light tan showing through. Bone texture is coarse. Bone has a porcelain ring.

Additional human remains: None.

Dental Pathology:

Cranial Pathology: Cranial vault thickness measurements range from 6 mm in the frontal bone to 9 mm at the left parietal eminence. Coarse, raised, puffy looking porosity (0.1 - 0.4 mm) of the superior occipital, posterior parietal and along the sagittal suture. The frontal doesn't appear affected. There is no cribra orbitalia.

Skeletal Pathology:

Noteworthy Features: Small round cranium.

Comments: Only the cranium is present in the laboratory, there is no additional human bone.

Burial Number: 1968 - 124

Archaeological context: Middle Period 4, level V, Square 2E, NE quadrant, AD 110 cm, orientation W-SW. Supine, extended adult skeleton with skull, right hand, and foot removed by later disturbance. An ovid skull and limb bones, six spindle whorls located beyond and to the right of the skull. Beyond these are a large pot and two small pots. An oblong green crystal bead on upper chest and a very large pot near middle of right pelvis. Ovid bones along the left leg, sherds under presumed location of feet, leg and part of a pot to the right and a large piece of sandstone on a pot beyond.

Age: 35 - 40 years (auricular surface, cranial suture fusion, dental wear).

Sex: Female (cranial and infracranial morphology).

Stature: 154.9 ± 2.1 cm (5' 1") [right bicondylar femur and tibia].

Completeness: Partial skull and infracranial skeleton. Present from the cranium are the frontal missing the left supraorbital region, parietals missing the coronal suture, occipital including the condyles but missing the posterior foramen magnum, fragments of the right temporal, and maxilla with four molars and five anterior teeth. The infracranial remains include the clavicles, scapulae fragments at the glenoid, humeri missing the distal ends, right distal radius and fragment of ulna shaft, few hand bones , fragments of the ilia and ischia, femora, tibiae, fragments of the fibulae shafts; left talus, calcaneus and navicular; few rib fragments, and few vertebral facet fragments.

Preservation: Fair - Poor. The cranial vault bones were reconstructed from small fragments but the face could not be repaired because of insufficient fragments. The right femur was reconstructed to its complete length. There is significant weathering of all cancellous bone especially the vertebrae, innominates, foot bones and ribs. Bone color is mottled orange-tan and dark grey dirt is adherent. The cranial bones are more lightly mottled. Porcelain ring of most bones and bone texture is coarse.

Additional human remains: None.

Dental Pathology: Slight alveolar resorption of the left maxillary first and second molar sockets and moderate at the left third molar socket. Hypoplasia, in the form of a fine horizontal line with coarsening of the enamel below the line and an apparent narrowing of the crown at the line, of the left maxillary canine, which suggests physiological stress at age 3 years. Dental attrition exposes the dentin in the premolars and lateral incisor, and cusps are flattened in the molars.

Cranial Pathology: Slight fine porosis. Vault thickness measurements range from 4 - 7 mm.

Skeletal Pathology: Slight osteoarthritis in the acetabula, carpals and tarsals. There is an area of fine, reactive bone (16 x 6 mm) in the right superior acetabulum, within the joint capsule, near the anterior inferior iliac spine. The reactive bone is abruptly raised 2-3 mm off the articular surface. The femoral head is weathered. The left clavicle is longer (7 mm) and thinner than the right especially at the medial end, but there is no evidence of callus formation, angulation or thickening. Possible childhood clavicle fracture.

Noteworthy Features: The nasal sulcus is a long narrow groove extending from the process to the midline.

Comments: Aging: Cranial suture closure post. $\Sigma \geq 3$ $\geq 34.7 \pm 7.8$, ant. $\Sigma \geq 0$ $\geq 32.0 \pm 8.3$. Bags are labelled both B124 and M124 - the remains appear to be a single individual. Photographs: nasal sulcus, molar wear, right acetabulum, canine hypoplasia.

Burial Number: 1968 - 125

Archaeological context: Early Period 1, level I, Square 3E, middle of square, AD 135 cm, orientation SE. Supine child with right arm over chest; pot next to the knee, two pots over the feet and beyond. Associated mound.

Age: 3 - 5 years (dental eruption, epiphyseal fusion, diaphyseal length).

Sex: ?Male (iliac morphology).

Stature: Cannot be determined.

Completeness: Fragmentary skull and partial infracranial skeleton. Identified from the skull are the right mandible at the coronoid process and gonion, maxilla, zygomas, frontal at the nasal suture, parietal and occipital fragments, temporals, *pars lateralis*, and *pars basilaris* fragment. The infracranial skeleton includes three vertebral bodies, four arch fragments, 18 rib fragments, left ilium, left humeral diaphysis fragments, diaphyseal fragments of the ulnae and radii, femoral diaphyses missing the distal ends, tibial mid-diaphyses, and a fibula diaphysis missing the ends.

Preservation: Fair - Poor. The maxilla is the best preserved portion of the skull. Vault bones are crushed into less than 1 inch pieces. Ribs and vertebrae are barely represented. No complete diaphysis. Weathering loss and old breakage of most bones. Bone color is a dark gray black with small amounts of dark orange-brown. Bones have a porcelain ring.

Additional human remains: Mound 125 - cranial and infracranial fragments.

Dental Pathology: Slight dental wear of the maxillary posterior deciduous teeth.

Cranial Pathology: Cranial vault thickness measurements range from 2 - 4 mm.

Skeletal Pathology: None noted.

Noteworthy Features: Cranial vault reconstruction not attempted.

Comments:

Burial Number: 1968 - M125

Archaeological context: Early Period 1, level I, square 3E, middle of square, AD 135 cm, orientation SE. Mound associated with a child burial. Mound contained two sandstone slabs, piece of worked sandstone, fish bone, sherds, human skull and arm fragment.

Age: 30 - 40 years (cranial suture fusion and dental wear).

Sex: ?Female (cranial morphology).

Stature: Cannot be determined.

Completeness: Fragmentary cranium and infracranial remains. Present from the cranium are the maxilla missing the left central incisors and second molar, frontal missing the right orbit and coronal suture region, right parietal, left parietal missing the coronal suture, and right occipital missing the basiocciput. Infracranial remains include bilateral radial shaft fragments, left distal clavicle, left scapular fragments, left first and second metacarpals, left ischium fragment, a single cervical vertebral body, right fourth metatarsal, and right fibular shaft fragments.

Preservation: Good - Fair. The maxilla and parietal bone fragments are well preserved and were reconstructed. There are insufficient fragments to complete restoration. The infracranial remains are incomplete, weathered,. broken and no reconstruction was possible. There is both fresh and old breakage. Bone color is mottled tan and grey with a coarse texture. Bone has a porcelain ring and grey dirt adherent.

Additional human remains: Burial 125.

Dental Pathology: Possible premortem loss of the right maxillary third molar. Slight calculus on the maxillary molars. Slight hypoplasia of the maxillary incisors and canines, in the form of a horizontal groove on right teeth, and linear and non-linear pitting on the left, which suggests physiological stress at age 3.4-4.6 years. Dental attrition exposes the dentin in all the teeth. There are light brown horizontal stains on the enamel of the maxillary anterior teeth.

Cranial Pathology: Cranial vault thickness measurements range from 4 - 9 mm. Healed coarse porosis of the external vault, superior parietal bones.

Skeletal Pathology: Slight osteoarthritis of the glenoid, metacarpals, and acetabulum.

Noteworthy Features:

Comments: Aging: Cranial suture closure post. $\sum \geq 5$ $\geq 34.7 \pm 7.8$, ant. $\sum \geq 1$ $\geq 32.0 \pm 8.3$. Photographs: maxillary dentition, cranial porosis.

APPENDIX D: RAW DATA

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
1	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	1	1	1	1	1	1	1	8	.	.	.	1	1	1	.	.	.	.	.	.
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3	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
4	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	1	1	1	.	.	.	.	1	3	3	1	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1
6	.	7	.	.	.	.	.	1	1	1	8	1	2	1	7	8	.	7	1	1	1	1	1	1	1	1	1	1	1	1	7	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	1	1	1	.	.	.	.	.	1	1	1	.	1	.	1	.	1	1	1	.	.	.	.	.	1	1	1	1	1	.	.	.	1	.	.	.	.	.	.	.	.
8	1	1	1	2	.	.	.	.	.	.	.	2	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	2	2	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	8	.	.	.	.	8	.	.	8	.	.	.	.	1	.	.	.	.	1	1	1	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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7	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	.	.
8	1	2	2	2	.	.	.	.	.	.	.	.	.	.	2	.	2	0	1	.	.	.	.	.	.	.	.	.	0	0	0	2	.	.	.	.	.	.	.	.	.	.	.	.
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DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
1	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	1	1	1
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5	.	.	.	.	2	2	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	0	1	1	0	.	.	0	0	0	0	0	0	.	.	.	.	.
6	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	.	.
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OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
1	1	1	2	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	2	2	1	1	1	1	1	0	UHM	3	7	FEMALE	ADOL	BC1	4
2	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1	1	1	.	.	.	.	2	2	2	2	2	1	UHM	3	7	MALE	MIDAGE	BC1	5
3	.	.	.	.	.	.	1	.	.	.	1	2	1	2	2	1	1	1	1	.	.	.	1	1	1	2	2	1	UHM	3	7	MALE	MIDAGE	BC1	7
4	1	1	.	.	.	.	.	.	.	.	.	1	2	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC1	8
5	2	3	3	.	.	.	.	2	.	.	2	.	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2	.	UHM	3	7	MALE	MIDAGE	BC1	9
6	.	.	.	1	1	1	.	1	.	1	0	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1	.	.	UHM	3	7	?SEX	CHILD	BC1	10
7	1	1	.	.	.	.	.	.	1	.	.	.	.	1	.	1	1	2	.	.	.	.	.	1	1	.	1	0	UHM	3	7	FEMALE	ADOL	BC1	11
8	.	.	.	.	.	.	.	.	1	2	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	UHM	3	7	MALE	MIDAGE	BC1	12
9	.	.	0	.	.	.	0	.	.	0	.	.	.	.	0	.	.	.	.	0	0	0	.	0	0	0	.	.	UHM	31	7	?SEX	CHILD	BC1	14

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
10	.	1	1	1	1	2	1	2	2	2	2	1	1	1	1	.	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	.	1	1	.	.	.	.	.	.	.	.	.
11	.	3	1	.	.	.	.	.	2	2	2	.	.	.	.	.	3	3	3	1	1	1	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	6	1	1	1	1	1	1	1	.	.	.	1	1	1	1	6	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9	.	0	0	0	0	0	0	0	.	.	.	0
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
14	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	.	.	.	1	.	1	1	1	.	.	1	1	1	1	1	.	.	3	1	1	1	1	1	.	.	.	1	1	1	1	3	.	.	.	.	0	.	.	.	.	.	.	.	.
17	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	.	1	1	1	1	1	1	1	1	1	1	1
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	3	3	3	3	3	2	.	.	1	2	3	2	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
10	.	1	1	.	.	1	1	1	1	1	2	2	2	2	1	1	1	1	1	.	.	.	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0
11	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0	.	.	.	.	.	.
12	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	1	.	0	0	.	0	0	0	0	0	0	0	.	.	.	0	0	0	0	.	.	.	0	0	.	0	0	0
13	2	2	2	2	1	1	1	1	1	1	1	1	.	.	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	0	0	0
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	1	1	1	1	.	1	.	1	1	1	1	.	1	1	1	1	1	1	1	1	.	3	2	0	0	.	0	.	.	.	.	0	1	0	2	2	.	2	.	2	2	1	1	.
16	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	0	0	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.
17	1	1	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	0	0	0	0	0	0	0	0	.	.	.	0	0	0	.	.	.	.	.	0	0	0	0
18	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1
10	0	0	0	0	0	0	1	.	.	.	.	0	0	0	0	0	0	0	0	0	0	.
11	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0	.	.	.
12	0	0	0	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	0	0	0
13	.	.	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	1	1	1	1	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
10	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	1	1
11	.	.	.	.	.	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	0	.	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	.	1	1	1
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	0	0	.	.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2
16	.	.	.	.	0	0	0	0	0	.	.	.	0	0	1	0	.	.	.	.	.	2
17	0	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	.	.	1	1	1
18	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1
10	1	.	2	.	.	.	.	1	1	1	0	.	.	1	2
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	1	1	1	1	.	.	.	1	1	1	1	.	0	1	1
13	1	2	2	3	3	2	2	1	1	2	1	1	1	1	1
14	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
15	2	2	2	3	3	3	2	2	2	3	1	1	.	3	4
16	.	2	2	2	.	.	2	2	2	2	1	.	.	.	3
17	1	1	1	2	2	1	1	1	1	1	1	.	.	1	1
18	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.

OBS	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
10	1	1	1	2	2	2	2	1	1	1	1	1	.	UHM	3	7	FEMALE	YG ADULT	BC1	16
11	2	2	2	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC1	17
12	1	1	1	1	1	1	1	1	1	1	2	1	0	UHM	3	7	FEMALE	YG ADULT	BC1	19
13	1	1	2	2	2	.	.	2	1	1	1	1	1	UHM	3	7	MALE	MIDAGE	BC1	20
14	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	MALE	ADOL	BC1	22
15	3	2	2	2	.	2	2	2	1	2	3	2	2	UHM	3	7	MALE	MIDAGE	BC1	23
16	2	2	2	2	.	.	.	2	3	3	3	.	.	UHM	3	7	FEMALE	OLD	BC1	24
17	1	1	1	1	2	2	1	1	1	1	1	1	.	UHM	3	7	MALE	CHILD	BC1	25
18	.	.	.	.	.	3	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC1	28

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	1	1	3	3	.	.	.	.	.	.	.	.	.	.	.	.
20	.	.	.	1	1	.	.	.	.	1	1	1	1	.	.	.	.	1	1	.	1	.	.	.	.	1	1	1	1	1	3	1	.	.	.	1	1	.	.	.	.	1	1	1
21	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	2	2	1	2	.	.	1	1	.	.	.	.	.	.	.	.	.
22	.	.	1	1	1	1	1	5	5	1	1	1	1	1	1	1	2	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	.	.	1	1	1	1	1	.	.	1	1	2
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	1	1	2	2	.	.	.	2	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	1	.	8	.	.	.	8	8	8	8	8	1	8	.	.	8	1	.	.	8	7	7	7	7	.	8	8	1	8	.	.	.	0	.	.	.	.	.	.	.	.	.
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	1	2	2	2	2	2	2	2	2	2	2	2
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	9	2	2	2	2	2	1	1	1	1	1	1	1
27	.	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	.	.	.	.	1	2	1	1	1	1	.	1	1	1	1	1	.	1	1	1	1	1

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	1	.	.	.	.	1	1	.	1	.	.	.	.	1	1	1	1	1	.	1	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	2	2	2	2	.	.	2	1	1	1	1	.	.	.	1	1	1	1	2	2	.	.	.	1	0	0	0	.	.	.	.	0	.	.	.	2	1	1	1	0	0	0	.	.
23	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	0	.	.	.
24	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.
25	2	2	2	.	.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	.	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0
26	1	2	2	.	2	2	2	2	2	2	.	.	.	.	2	2	2	2	2	2	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	.	0	0	0	0	1	1	0	0
27	1	1	1	1	1	1	1	1	.	0	.	.	.	.	1	.	1	1	1	1	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1
19	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
21	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	0	1	2	2	2	.	.	.	0	1	0	1	.	.	1	0	0	0	0
23	.	.	.	0	1	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	.	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	.	.	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0

OBS	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.
20	.	.	.	.	0	.	.	.	.	.	.	.	0	0	0	0	1	.	0	.	.	2
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	1	2	.
22	.	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	.	.	3	2
23	.	.	.	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.
24	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.
25	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	1	2	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1
27	0	.	0	0	0	0	.	.	.	.	.	.	0	0	0	0	0	0	.	1	1	1

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.
20	2	.	.	.	.	2	2	3	2	.	.	.	.	2	2	.	2	.	.	.	.	2	3	3	2	3	.	1
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	2	.	.
22	3	3	3	.	.	3	2	2	2	3	2	1	.	.	3	3	3	2	3	.	.	.	3	3	3	3	2	1
23	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	2	2	.	.	.	.	.	.	2	2	3	2	2
24	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	0	0	0	0	.	.	.	0	.	.
25	1	1	1	2	2	1	1	1	1	2	1	.	.	1	2	1	1	1	2	2	2	2	1	1	1	2	1	.
26	2	2	3	3	3	3	3	2	2	1	1	.	1	1	2	1	1	2	.	.	.	.	2	2	2	2	1	1
27	1	1	.	1	1	1	1	1	1	1	0	.	1	1	2	1	.	1	.	.	.	.	1	.	1	2	1	1

OBS	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
19	UHM	3	7	FEMALE	OLD	BC1	31
20	UHM	3	7	FEMALE	MIDAGE	BC1	33
21	UHM	3	7	FEMALE	MIDAGE	BC1	33A
22	UHM	3	7	FEMALE	MIDAGE	BC1	34
23	UHM	3	7	MALE	MIDAGE	BC1	35
24	UHM	3	7	MALE	CHILD	BC1	38
25	UHM	3	7	FEMALE	MIDAGE	BC1	41
26	UHM	3	7	MALE	MIDAGE	BC1	43
27	UHM	3	7	FEMALE	YG ADULT	BC1	45

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.
30	8	1	1	1	2	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.
31	.	.	3	1	1	1	1	1	.	.	1	1	1	1	.	.	.	1	1	1	1	1	.	.	2	1	2	1	3	3	1	.	.	.	.	1	1	1	1	1	.	.	1	1
32	.	.	.	.	.	.	.	7	7	.	.	.	.	1	.	.	.	.	1	.	.	.	.	1	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	1	1	1	1	1	1	2	1	1	2	1	1	2	1	.	.	.	1	1	1	1	1	3	3	.	.	.	.	.	.	.	.	2	2	2	2
35	.	.	8	.	.	.	.	8	8	8	.	.	.	8	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
28	1	1	1	1	1	1	1	1	1	.	.	.	.	.	1	1	1	1	1	1	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.
31	1	1	.	.	.	1	1	1	1	1	.	.	.	1	.	1	.	.	1	.	.	.	.	0	0	0	0	0	.	.	1	.	1	1	.	.	.	0	2	0	0	1	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	2	2	.	2	.	.	1	1	.	1	.	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	1	.	.	0	0	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
28	.	.	0	0	0	0	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	0	0	0	0	.	.	1	1	2	1
29	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
31	.	1	.	1	.	.	2	.	.	.	.	0	0	0	0	0	.	.	0	0	0	1	.	.	.	0	0	0	0	0	.	.	.	0	1	0	.	1	1	.	.	.	.	4
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	1	1	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
28	1	2	2	2	2	2	2	1	1	2	1	1	1	1	2	1	1	.	.	.	.	.	2	1	1	2	1	1	UHM	3	7	MALE	YG ADULT	BC1	47
29	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC1	48
30	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	31	7	FEMALE	YG ADULT	BC2	1
31	3	3	3	3	.	.	3	2	1	3	.	.	.	2	3	2	4	4	.	.	.	4	.	4	.	.	2	.	UHM	31	7	MALE	MIDAGE	BC2	2
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	MALE	CHILD	BC2	5
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	UHM	3	7	MALE	MIDAGE	BC2	6
34	.	.	.	.	3	3	3	3	3	3	.	1	3	.	3	3	.	3	.	.	.	3	3	3	3	3	.	.	UHM	31	7	MALE	OLD	BC2	7
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	31	7	FEMALE	CHILD	BC2	8
36	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC2	9

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1	3	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	1	1	1	1	2	2	1	1	2	1	1	1	3	3	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	2	2	2	2	2	2	2	2	2	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.
40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.
41	.	1	1	1	1	1	4	1	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	.	.	.	.
42	.	8	.	.	.	.	.	.	.	.	.	8	.	1	8	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	3	1	1	1	1	2	1	2	2	.	.	3	1	1	1	1	1	2	1	2	1	2	3	3	3	2	1	2	2	2	2	1	.	2	2	1	.	.	.	.	.	.	.	.
44	.	1	1	.	1	.	.	.	.	.	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
45	.	.	.	.	.	.	.	.	2	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
37	.	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	1	1	1	1	.	.	1	1	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40	1	2	2	2	1	1	1	1	.	.	.	.	.	.	.	.	1	1	1	1	1	.	.	0	0	0	0	.	.	.	.	.	0	0	0	1	1	0	0	.	.	.	.	.
41	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.
42	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.
43	1	2	2	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	2	.	.	0	0	.	.	.
44	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	0	1	1	0	0	0	0
45	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1	0	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
37	1	1	1	1	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	.	.
38	0	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.
39	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	1	0	0	0	0	.	.	.	.	.
40	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	0	0	0	0	0	1	1	2	1
41	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	0	0	.	.	1	1	0	0	0	0	1	.	1	.	.	.	.	0	0	0	0	0	1	1	.	0	.	.	.	.	.	1	0	0	1	1	0	.	2	3	3
44	0	0	0	0	0	0	0	0	.	0	0	.	.	.	.	.	.	.	.	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	2	.
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	2	1	1	2	2	.	UHM	3	7	FEMALE	MIDAGE	BC2	11
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	1	.	.	2	2	.	1	1	2	.	.	UHM	3	7	FEMALE	MIDAGE	BC2	15A
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	UHM	3	7	FEMALE	YG ADULT	BC2	17
40	1	1	2	2	2	2	1	1	1	2	1	1	1	1	2	1	.	1	1	1	1	1	1	1	.	2	1	1	UHM	3	7	FEMALE	YG ADULT	BC2	19
41	2	3	4	3	3	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC2	20
42	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	0	.	.	.	.	.	.	.	UHM	3	7	FEMALE	CHILD	BC2	21
43	3	3	.	.	.	.	.	.	3	2	2	1	2	.	3	.	2	.	.	.	.	.	3	.	.	.	.	2	UHM	3	7	MALE	MIDAGE	BC2	22
44	1	.	.	.	.	.	.	1	.	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	2	2	1	UHM	3	7	MALE	YG ADULT	BC2	24
45	.	.	.	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	ADULT	BC2	25A

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
46	.	.	8	.	.	.	.	.	8	8	8	8	8	8	8	.	.	.	.	.	.	.	.	.	8	8	8	8	.	8	8	.	.	.	.	.	.	.	.	.	.	.	.	.
47	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1
48	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	1	1	3	1	1	1	1	3	.	.	2	2	2	1	1	1	1	1	1	2
49	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0
50	1	1	1	2	1	1	1	1	2	2	2	1	2	1	1	2	1	1	1	1	1	2	2	1	2	1	1	1	1	1	1	1	2	2	2	.	1	1	1	1	.	.	.	2
51	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	1	1	1	1
52	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1
53	1	1	1	1	1	1	1	1	1	1	3	1	1	1	2	2	3	3	4	1	1	1	3	3	1	3	1	1	1	3	3	3	2	2	2	2	2	2	2	2	1	1	.	2
54	.	3	3	1	3	2	2	1	1	1	1	3	3	.	.	.	.	.	.	.	.	1	2	2	1	1	1	1	1	3	1	3	.	.	.	1	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	0	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0
48	2	2	2	2	.	.	.	.	.	.	.	.	.	1	.	1	1	2	2	.	.	.	.	2	.	.	.	.	2	2	2	2	2	1	2	1	.	.	.	.	.	.	.	.
49	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
50	.	2	2	.	2	2	2	1	1	.	.	2	.	2	2	1	1	2	2	2	0	0	0	1	0	0	0	0	0	1	0	0	1	0	2	3	1	0	1	0	0	.	0	0
51	1	2	1	.	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	1	1	1	2	1	1	1	0	0	0	0
52	1	2	2	.	.	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	.	.	1	1	0	0	0	0	0
53	2	2	2	.	.	.	.	2	2	2	.	.	1	.	2	2	2	.	.	.	2	2	2	1	1	1	1	1	1	1	.	2	2	2	2	2	.	.	3	3	3	3	.	.
54	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2
48	1	1	.	2	2	2	1	.	.	.	0	0	1	0	0	0	0	0	0	0	0	0	1	0	.	.	.	.	.	.	.	.	.	0	1	0	0	0	0	.	1	2	2	2
49	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	.
51	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	.	1	2	1
52	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
53	3	.	3	3	3	.	.	.	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	1	1	1	1	1	.	.	.	.	.	0	0	0	1	1	1	1	1	2	2
54	.	.	.	.	.	.	.	.	.	.	.	1	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	1	0	.	.	.	.	3

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	CHILD	BC2	26
47	2	2	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	UHM	3	7	FEMALE	MIDAGE	BC2	27
48	2	2	2	2	2	2	2	2	2	2	1	1	.	.	.	.	.	.	.	.	2	2	.	2	2	2	1	.	UHM	3	7	FEMALE	MIDAGE	BC2	28
49	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	UHM	3	7	FEMALE	YG ADULT	BC2	29
50	2	2	2	2	.	.	.	2	.	3	2	.	2	2	3	2	2	.	.	2	.	2	2	2	2	3	2	1	UHM	3	7	MALE	MIDAGE	BC2	31
51	2	1	1	2	2	1	1	1	1	2	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	UHM	3	7	FEMALE	YG ADULT	BC2	33
52	1	1	1	2	2	1	1	1	1	2	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	UHM	3	7	FEMALE	YG ADULT	BC2	34
53	2	2	2	2	2	2	.	2	2	2	.	.	.	.	.	3	3	3	.	.	.	.	3	3	3	.	.	.	UHM	3	7	MALE	MIDAGE	BC2	35
54	.	.	.	3	3	2	3	.	.	.	.	.	.	.	.	.	.	2	.	.	3	3	3	2	2	.	3	.	UHM	3	7	MALE	MIDAGE	BC2	40

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC
55	.	3	3	1	1	1	4	1	3	1	1	1	1	1	3	.	.	4	1	1	1	1
56	1	1	1	1	2	1	2	2	2	2	2	3	1	1	1	2	1	1	1	1	1	1
57	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
58	.	.	1	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	1	1	1	1	1	2	2	2	1	1	2	2	1	1	1	1	.	.	.	.	.	.
60	2	1	1	1	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	1	1
61	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	.	.	.
62	.	8	8	.	.	.	8	8	8	.	.	.	.	8	.	.	.	.	8	.	.	.
63	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2

OBS	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
55	1	1	1	1	1	1	3	1	1	3	.	.	.	.	.	.	.	.	1	.	.	.
56	1	2	2	2	1	1	1	1	1	1	2	2	2	1	.	1	.	.	.	.	.	.
57	1	2	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.
58	.	.	.	.	1	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
59	.	.	1	1	1	1	1	1	1	1	0	1	1	0	.	.	.	.	0	0	.	.
60	1	1	1	1	1	1	2	1	1	8	.	1	1	1	1	1	1	1	1	1	1	1
61	.	.	7	.	.	.	.	1	.	.	.	.	0	.	.	.	.	.	.	.	.	.
62	.	8	.	.	.	.	.	8	.	.	.	.	1	.	.	.	.	.	.	.	.	.
63	2	5	5	2	1	1	1	3	1	8	1	1	1	1	1	1	1	1	1	1	1	1

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	1	2	2	.	2	2	2	1	1	1	1	.	.	.	1	1	1	2	2	2	1	1
57	1	1	1	2	1	1	1	1	1	1	1	.	.	.	1	1	1	1	1	1	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	0	1	1	0	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1	0
60	1	.	.	1	1	1	1	1	1	2	2	2	2	2	2	1	.	1	1	.	0	1
61	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	1	1	1	1	1	1	1	1	1	.	.	.	.	.	1	1	1	.	1	.	0	0

OBS	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
55	.	2	2	2	3	3	.	2	3	3	3	3	.	.	.	3	2	1	1	1	2	3
56	1	0	0	0	0	0	.	0	0	.	1	1	1	1	1	1	1	0	0	0	0	0
57	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1
58	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	0	0	1	0	0	0	0	0	0	0	1	0	0	0	.	.	.	.	.	.	.	.
60	2	2	1	1	1	1	1	1	1	1	2	.	.	2	0	0	0	0	0	1	1	1
61	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	2	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
55	.	0	0	1	.	1	3	.	.	.	.	0	0	0	1	0	.	.	.	1	1	1	.	.	.	1	1	0	0	0	0	0	0	0	0	0	.	0	1	.	.	.	.	3
56	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	1	0	0	2	2	2	2
57	1	1	1	1	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2
58	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
59	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	1	1	1	1
60	1	0	0	0	.	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	0	1	0	0	0	0	0	0	0	0	0	0	0	.	0	0	.	.	2	2	2
61	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	1	0	0	0	.	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	.	0	.	0	1	1	1

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
55	3	3	.	2	.	2	2	2	2	2	.	.	.	.	3	3	3	3	3	2	2	2	3	2	.	3	2	.	UHM	3	7	MALE	MIDAGE	BC2	45
56	.	2	.	.	.	.	.	.	2	2	2	.	1	2	2	2	4	4	4	.	.	.	4	2	2	2	2	1	UHM	3	7	FEMALE	MIDAGE	BC2	46
57	3	3	2	3	3	2	3	3	2	2	2	2	2	2	2	2	2	2	2	.	.	.	2	2	2	2	2	2	UHM	3	7	MALE	MIDAGE	BC2	47
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	2	.	.	.	UHM	3	7	MALE	MIDAGE	BC2	49
59	.	.	.	.	2	2	.	.	1	1	1	1	.	.	.	.	.	.	.	.	2	2	1	1	1	2	1	1	UHM	3	7	MALE	YG ADULT	BC2	50
60	3	2	2	2	2	2	2	3	2	.	.	1	1	2	2	2	2	2	2	2	2	2	2	2	.	1	2	.	UHM	3	7	MALE	MIDAGE	BC2	51
61	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	UHM	3	7	MALE	CHILD	BC2	52
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	CHILD	BC2	54
63	1	1	1	2	2	1	1	1	1	1	0	0	0	1	1	1	1	.	.	.	.	.	1	1	1	.	1	.	UHM	3	7	MALE	ADOL	BC2	55

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
64	1	1	1	1	1	1	.	1	.	.	.	.	.	.	.	1	.	.	.	1	1	1	1	.	1	1	1	1	1	3	1	3	1	1	1	1	1	1	.	1	.	.	.	.
65	.	.	.	2	1	1	2	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	2	1	1	1	1	1	1	1	6	.	.	.	.	1	1	.	.	.	.	.	.
66	.	1	1	1	1	1	.	.	1	1	1	1	1	1	.	.	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	.	1	1	1	1	1	.	.	.	1	1	1
67	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	.	1	1	1	1	1	1	1	1	1
68	.	3	1	1	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
69	.	.	1	.	.	.	.	.	8	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	0	.	.	.	.	.	.	.	.
70	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	3	1	1	1	1	1	1	1	2	1	1	1	1	1	3	3	.	2	2	1	1	1	1	1	1	1	1	1
71	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	.	1	1	1
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
64	.	.	.	1	.	.	.	2	2	2	2	.	2	2	2	2	2	.	2	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	1	0	.
65	.	.	.	.	.	1	.	1	1	1	1	.	1	1	1	1	2	1	1	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	0	.
66	1	1	.	.	.	0	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0	0
67	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	.	1	1	0	0	0	0	0	.	.	1	1	2	2	2	1	1	0	0	0	.	.
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.
70	1	2	2	.	.	1	1	1	1	1	1	1	.	1	1	1	1	1	.	.	2	2	2	1	1	1	1	1	1	1	2	2	1	1	2	2	.	0	1	1	0	0	0	1
71	1	1	2	2	2	2	2	2	1	1	1	1	.	1	1	1	2	2	2	2	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	.	.	.	.
72	.	.	.	.	1	1	1	2	2	2	2	2	.	2	2	.	2	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	0	0	0	0	0	0

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
64	.	1	2	1	2	.	2	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	0	0	0	0	0	.	0	.	0	1	1	3
65	.	.	.	1	1	0	0	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	.	.	.	.	.
66	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	1	1	1
67	.	.	0	1	1	1	1	2	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	.	2
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
69	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.
70	1	0	0	0	0	1	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	1	2	2
71	.	1	1	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2
72	.	.	.	.	.	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	.	.	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
64	3	3	.	3	.	.	.	.	.	.	.	0	.	.	.	3	3	3	3	.	3	3	3	3	3	.	3	.	UHM	3	7	MALE	MIDAGE	BC2	56
65	2	2	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	3	.	3	3	2	2	2	2	1	.	UHM	3	7	FEMALE	MIDAGE	BC2	57
66	1	1	.	.	1	1	1	1	1	1	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	UHM	3	7	?SEX	ADOL	BC2	58
67	3	3	2	2	2	2	2	3	2	2	2	1	2	1	2	3	3	2	2	2	2	2	2	3	3	3	3	2	UHM	3	7	FEMALE	MIDAGE	BC2	59
68	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC2	61
69	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	UHM	3	7	FEMALE	CHILD	BC2	62
70	1	2	1	2	2	2	2	2	2	2	1	.	.	2	2	1	1	1	1	2	.	2	2	2	2	2	.	.	UHM	3	7	MALE	MIDAGE	BC2	65
71	2	2	2	3	.	2	2	2	2	2	2	1	2	2	3	2	2	1	2	2	.	2	1	2	2	3	2	2	UHM	3	7	MALE	MIDAGE	BC2	72
72	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	1	2	2	2	.	2	2	.	2	2	2	2	UHM	3	7	MALE	MIDAGE	BC2	73

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	4	1	1	3	1	4	2	4	4	4	4	3	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
74	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1	3	1	1	1	1	1	1	1	2	1	1	2	1	1	4	1	0	1	1	1	1	1	1	.	.	.	.	1
75	3	3	1	1	1	1	2	2	2	3	1	1	1	1	1	3	3	1	4	1	2	2	3	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	.	.	.	.	2	2
76	3	1	1	2	4	2	1	1	1	1	1	1	1	1	1	.	3	3	3	1	1	1	2	1	4	1	1	1	1	1	3	4	.	1	1	.	.	.	1	1	1	1	1	1
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	1	.	.	.	8	7	.	.	.	.	.	1	.	.	.	.	1	.	.	.	8	1	1	7	.	.	.	1	.	.	.	.	0	.	.	.	0	0	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	2	2	2	1	1	1	1	2	1	3	3	3	1	1	1	1	1	1	1	1	4	3	3	1	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	1	1	1	1	1	4	1	4	1	1	1	1	1	1	9	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
73	.	.	.	.	.	.	1	1	.	1	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	1	.	1	1	1
74	1	.	.	.	.	1	1	1	1	1	1	1	.	1	1	.	1	1	.	1	.	.	1	1	.	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0	0	0	0	0
75	2	2	2	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	2	2	2	2	.	2	2	2	2	2	.	.	2	2	2	1	1	.	.
76	1	2	2	.	.	.	.	1	1	1	.	1	1	1	1	1	1	1	.	.	2	1	1	2	2	1	1	1	1	1	1	2	2	2	2	.	.	.	2	0	0	1	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	0	.	.	.	.	0	.	.	.	.	0	0	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0
79	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	2	2	.	2	.	.	.	1	1	1	1	1	1	1	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	2	0	2	2	1	1	1
81	.	.	.	.	0	1	1	1	2	2	.	2	.	2	1	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
73	1	1	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.
74	.	0	0	.	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	1	2	1
75	.	.	.	.	.	.	.	.	.	.	0	0	1	0	0	0	0	.	0	1	0	0	0	.	.	0	1	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	3	2
76	.	.	.	0	1	2	.	0	.	0	0	0	1	0	0	1	1	0	0	1	0	1	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	.	0	.	3	3	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	0	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0	0	.	.	.	.	0	.	.	.	.	0	.
79	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	.
80	1	1	1	3	3	0	2	1	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	1	.	.	1	0	0	0	0	0	0	1	1	.	1	0	.	.	.	.
81	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	2	.	.	.	.	.	.	.	2	2	.	UHM	3	7	MALE	MIDAGE	BC2	74
74	1	2	2	2	2	2	.	1	1	.	.	.	.	1	2	1	1	1	2	2	.	2	1	.	1	1	.	1	UHM	3	7	MALE	YG ADULT	BC2	76
75	3	3	.	.	.	.	3	3	2	3	2	.	.	2	4	2	.	.	.	.	.	.	.	.	.	.	.	.	UHM	3	7	FEMALE	MIDAGE	BC2	79
76	4	.	3	3	3	3	3	3	2	3	2	.	.	.	.	2	2	.	.	2	.	2	2	2	2	3	.	.	UHM	3	7	MALE	MIDAGE	BC2	2386
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	SIR	.	7	FEMALE	MIDAGE	NNT	1 2
78	.	.	.	0	.	.	.	.	.	0	.	.	.	.	1	.	.	.	.	0	0	.	.	.	.	1	.	.	SIR	3	7	FEMALE	CHILD	NNT	1 7
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	1	2	2	1	SIR	.	7	FEMALE	OLD	NNT	1 8
80	.	.	.	.	.	.	.	4	4	2	3	.	1	.	.	.	4	.	2	2	2	2	3	4	.	.	.	3	SIR	.	7	MALE	MIDAGE	NNT	1 12
81	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	1	.	2	.	2	2	2	1	2	2	.	SIR	.	7	MALE	YG ADULT	NNT	1 12A

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
82	.	.	.	.	2	4	4	4	.	.	.	.	.	.	.	.	6	1	4	4	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	2	3	3	.	.	1	.	.	1	1	1	3	3	3	1	1	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	1	.	2	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
86	6	3	1	1	1	2	2	1	2	2	.	.	2	3	3	6	6	1	3	4	1	1	1	1	1	1	1	1	1	3	1	6	.	.	1	1	1	.	.	1	.	.	.	.
87	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	.	2	1	1	1	1	1	1	2
88	1	1	1	1	1	1	2	.	.	.	1	1	2	1	1	2	1	1	1	1	1	4	2	.	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
90	1	1	1	1	1	1	4	1	.	4	1	1	1	1	1	1	1	1	1	1	1	1	.	.	1	1	1	4	1	1	1	1	0	0	0	0	0	0	.	0	.	.	0	0

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	0	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	2	.	.	2	2	2	2	2	2	2	2	2	.	2	.	.	1	2	2	2	2	2	2	.	.	.	.	.	.	.	.	.	1	.	3	1	0	0	0
87	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	0	0	0	0	0	0	0	0	.	0	.	.	0	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	0	0	0	.	.	.	.	0	0	0	1	1	1	0	0	0	0	0	0	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
90	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	.	0	0	0	0	1	1	0	0	1	.	.	.	.	.	1	1	1	.	.	.	0	0	0	0	0	0	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1
82	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	0	0	0	.	.	2	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.
86	0	0	0	1	1	.	1	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0
89	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
90	0	0	1	1	1	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	0

OBS	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
82	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
84	.	.	.	.	.	.	.	0	.	.	0	0	0	.	.	.	0	0	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	0	1	1	0	0	0	0	0	0	0	0	0	1	0	.	.	.	2	2
87	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	1	1
88	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	2	2	2	2
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.
90	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	1	1	1	1

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2
82	.	.	.	.	.	.	.	.	.	.	.	.	.	1
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	2	2	.	.	.	.
85	.	.	.	.	2	.	.	.	2	.	.	1	.	.
86	3	.	.	2	.	.	.	.	.	.	.	.	.	3
87	1	2	1	2	2	1	2	1	1	1	1	.	.	.
88	2	2	.	.	.	.	2	2	.	2	2	.	1	2
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.
90	1	1	.	2	.	.	1	1	1	1	1	1	1	1

OBS	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	.	7	MALE	YG ADULT	NNT 1	16
83	.	.	.	.	.	.	.	.	.	.	.	.	.	1	SIR	.	7	FEMALE	MIDAGE	NNT 1	17
84	.	.	.	2	.	.	2	2	2	.	.	.	3	1	SIR	.	7	FEMALE	MIDAGE	NNT 1	18
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	.	7	FEMALE	MIDAGE	NNT 1	20
86	.	4	2	3	3	3	3	3	3	2	2	.	3	.	SIR	.	7	MALE	MIDAGE	NNT 1	22
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	.	7	FEMALE	YG ADULT	NNT 1	23
88	2	2	2	.	.	.	2	2	2	2	2	2	2	2	SIR	.	7	FEMALE	MIDAGE	NNT 1	24
89	.	.	.	.	.	.	.	.	.	.	1	2	1	1	SIR	.	7	FEMALE	ADULT	NNT 1	25B
90	2	1	1	1	.	.	2	2	1	.	1	2	1	1	SIR	.	7	MALE	YG ADULT	NNT 1	26

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
91	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	.	1	1	.	.	.	.	.	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
92	.	1	1	1	1	4	4	4	4	4	8	1	1	1	1	1	.	1	1	3	1	1	.	.	.	.	.	1	1	1	1	.	.	1	1	1	1	.	.	.	.	.	.	1
93	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1	1	4	4	.	4	4	.	.	.	.	.	1	1	1	1	1	1	1	1	1	.	.	1	1
94	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3	3	2	.	.	3	3	1	1	1	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	1	1	1	1	1	1	1	.	.	.	.	1	.	.	1	3	1	4	1	2	1	1	1	1	2	1	4	1	.	.	.	.	1	1	1	0	0	0	0	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1	1	1	2	.	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	2	2	2	1	1	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.
92	1	1	1	1	.	1	1	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	0	0	0	.	.	.	.	.	.	0	0	0	0	0	.	2	2	.	.	.	.	.
93	1	1	1	1	1	1	1	2	2	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	0	0	0	0	1	1	.	.
94	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	0	.	.	1	.	1	1	1	.	1	1	1	1	.	1	1	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	0	0	.	.	.
98	.	1	1	1	1	1	1	1	1	1	.	.	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	.	0	.	0	.	.
99	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
91	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	1	.	.	.	.	.	.	.	0	0	0	0	0	1	1	1	1
92	.	.	.	.	0	1	1	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	.	.	.	.	.	.	.	.	.	0	0	0	.	.	1	1	1
93	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	0	1	1	2	1
94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.
97	.	.	.	0	0	0	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	2	2
98	.	.	.	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
91	1	2	2	2	2	1	1	1	1	1	1	.	.	1	1	.	.	.	.	.	.	2	2	1	1	1	1	1	1	SIR	.	7	FEMALE	YG ADULT	NNT 1	28
92	1	.	.	.	.	.	.	1	1	1	1	1	.	1	1	.	1	1	.	.	.	.	.	1	1	1	1	.	SIR	.	7	FEMALE	YG ADULT	NNT 1	30
93	1	2	1	2	.	.	1	1	1	1	1	0	1	1	2	1	1	.	.	.	.	.	.	.	.	.	.	1	SIR	.	7	FEMALE	YG ADULT	NNT 1	31
94	2	2	2	.	2	2	2	1	1	2	1	0	1	2	2	1	1	1	2	2	2	2	1	1	1	2	1	1	SIR	.	7	MALE	MIDAGE	NNT 1	34
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	3	7	?SEX	CHILD	NNT 1	36
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	2	.	.	.	SIR	.	7	FEMALE	OLD	NNT 1	40
97	2	2	2	3	3	.	.	.	.	2	.	.	1	.	3	.	1	.	2	2	2	2	.	1	1	3	.	.	SIR	.	7	FEMALE	MIDAGE	NNT 1	41
98	.	.	.	.	.	.	.	.	2	2	2	1	2	2	2	2	2	2	.	.	.	.	2	2	2	2	2	2	SIR	.	7	FEMALE	MIDAGE	NNT 1	42
99	.	.	.	.	.	.	.	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	3	7	MALE	MIDAGE	NNT 1	42I

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
100	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4	1	1	1	1	1	1	1	1	1	1	2	1	1	1	3	.	0	0	0	0	0	0	0	0	0	0	0
101	.	.	.	.	8	8	.	.	1	.	8	8	.	1	8	.	.	8	1	.	.	8	1	.	.	1	8	.	.	1	.	.	.	.	.	.	.	.	.	.	0	.	.	.
102	.	.	8	.	.	.	.	8	8	8	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	8	8	8	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	1	1	1	.	.	.	1	1	.	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	4	1	3	1	4	.	.	.	.	.	.	.	.	.	.	.	1
104	.	1	1	1	1	1	2	2	1	1	1	2	1	1	1	2	1	1	1	1	4	1	2	2	2	1	1	1	1	1	1	1	.	2	2	1	1	1	.	.	1	1	1	.
105	4	1	1	1	1	2	4	2	2	1	2	1	1	1	1	4	1	1	1	1	1	1	4	4	4	4	1	1	1	1	1	1	.	2	2	2	2	.	.	.	.	2	.	2
106	.	.	8	.	.	.	.	8	8	.	.	.	.	8	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	1	8	.	.	.	.	.	.	.	.	.	.	.	.	.	8	1	8	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	1	.	1	1	4	.	.	4	4	4	4	1	.	.	.	1	1	2	1	.	.	.	.	.	.	4	4	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
100	0	0	0	.	.	.	.	2	2	1	1	1	1	1	1	.	.	.	.	.	.	0	0	0	1	1	1	1	.	.	.	1	1	.	.	.	0	0	0	0	.	.	.	0
101	.	0	.	.	.	.	0	.	.	.	0	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0	.	.	.	0	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	1	1	1	.	1	1	1	1	1	1	2	2	2	2	1	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	0	0	0	.	.	.	.
104	1	2	2	.	2	2	2	2	.	2	.	.	.	2	2	2	2	2	2	2	.	.	.	1	1	1	.	.	.	.	1	1	2	2	2	1	1	1	1	1	1	1	1	1
105	2	2	2	.	2	2	2	2	2	2	.	.	.	.	2	2	2	2	2	2	1	1	1	1	1	1	1	.	.	.	1	1	0	0	0	0	1	1	2	1	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.
108	.	.	.	.	2	2	.	2	.	.	.	.	.	.	.	.	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1
100	.	.	.	.	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0
101	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0
104	1	1	1	1	1	1	1	1	.	.	0	0	0	0	0	0	.	.	0	0	0	0
105	.	.	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
108	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.

OBS	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
100	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	1	2	1
101	.	.	.	.	0	.	.	.	0	.	.	0	.	.	.	0	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	.	.	1	1
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	1	2
105	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	2	1
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.
108	.	.	0	1	.	.	.	.	.	.	.	.	0	0	0	1	0	0	.	2	.	3

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3
100	2	2	2	2	2	2	2	2	2	2	1	.	.	1	2	1	1	2	2	2	2	2	2	.	2	2	1	.
101	.	.	.	.	0	.	.	.	.	1	.	.	.	.	1	.	.	.	1	.	.	1	.	.	.	1	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	1	.	.	.	2	2	.	1	1	1	1	.	1	2	2	1	1	2	2	2	2	2	2	.	1	.	1	.
104	2	2	.	.	2	2	2	.	1	2	1	.	1	1	2	1	.	2	.	.	.	2	2	1	1	2	1	1
105	2	.	.	.	.	2	.	2	2	2	2	.	1	2	2	2	2	2	.	.	.	.	2	2	2	2	2	1
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
108	3	.	.	.	.	4	4	.	3	.	.	.	2	.	.	2	.	.	.	.	.	.	.	.	2	3	3	2

OBS	INSCODE7	YEARX7	CARD7	SEX7	AGE7	SITE7	SPECID7
100	SIR	.	7	FEMALE	MIDAGE	NNT 1	43
101	SIR	3	7	MALE	CHILD	NNT 1	44A
102	SIR	3	7	MALE	CHILD	NNT 1	46
103	SIR	.	7	FEMALE	MIDAGE	NNT 1	47
104	SIR	.	7	MALE	MIDAGE	NNT 1	48
105	SIR	.	7	MALE	MIDAGE	NNT 1	55
106	SIR	3	7	MALE	CHILD	NNT 1	57
107		.	7	FEMALE	CHILD	NNT 1	58
108		.	7	FEMALE	MIDAGE	NNT 1	59

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
109	.	.	.	.	.	.	.	.	2	2	1	1	1	1	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
110	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	9	1	1	1	1	1	1	2	4	1	1	1	1	1	1	9	1	1	1	1	1	1	.	1	1	1	1	1
111	.	.	.	4	4	4	1	4	3	3	2	1	3	3	3	.	.	.	.	.	4	4	4	3	3	4	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	1	1	1	1	1
113	.	.	.	.	.	.	.	.	.	.	8	8	.	.	8	.	.	8	4	.	.	7	1	1	1	1	7	.	.	1	8	.	.	.	.	.	.	.	.	.	.	.	.	.
114	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
115	.	.	.	.	.	.	.	.	2	2	2	4	4	2	1	.	.	.	.	.	4	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	1	1	.	.	.	1	1	1	.	.	.	.	1	1	1	1	1	1	3	3	3	3	1	1	1	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.
117	.	.	.	1	1	.	.	.	.	2	1	1	1	.	.	.	.	3	3	.	.	.	1	1	1	1	2	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
109	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	1	2	0	0	1	.	.	.	.	.	.	.	.
110	1	1	1	1	0	1	1	1	1	1	1	.	.	1	1	1	1	1	1	0	0	0	0	0	0	0	.	.	.	0	1	1	0	0	0	0	0	0	0	0	0	0	0	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.
112	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	.	.	.	.	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	2	2	2	2	2	2	2	2	2	2	2	2	.	.	2	2	2	2	2	2	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	.	.	1	.	.	.	.	.	.	3	3	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	2	2	2	2	2	2	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	3	1	1	.	0	0
117	0	.	.	.	.	.	.	.	.	.	1	1	1	1	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	.	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1
109	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0
111	.	.	1	1	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	0	.	.
112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0
116	0	0	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.

OBS	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
109	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	1	1	2	1
111	.	.	.	.	0	0	0	0	0	.	.	0	0	0	0	.	.	.	.	.	.	.
112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
113	.	.	.	0	.	.	.	0	0	.	0	0	.	.	.	0	.	.	.	.	.	.
114	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	1	1	2	1
115	.	.	.	.	.	.	0	0	1	0	0	0	.	.	.	.	.	.	.	.	.	.
116	.	.	0	0	1	0	0	0	.	.	.	.	0	0	0	.	.	.	.	.	.	.
117	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	3

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAR7	CARD7	SEX7	AGE7	SITE7	SPECID7
109	.	.	.	.	.	.	2	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	3	7	FEMALE	OLD	NNT 1	62
110	1	1	.	1	1	1	1	1	1	1	1	0	1	1	2	1	1	1	1	.	.	1	1	1	1	1	1	0	SIR	.	7	FEMALE	YG ADULT	NNT 1	63
111	4	.	2	.	.	.	.	4	.	.	.	.	.	.	.	.	4	4	4	.	.	.	3	3	.	.	.	.	SIR	.	7	MALE	OLD	NNT 1	65
112	1	1	1	2	2	2	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2	2	1	1	1	1	1	1	SIR	.	7	MALE	YG ADULT	NNT 1	67
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	1	.	SIR	3	7	FEMALE	CHILD	NNT 1	74
114	1	2	2	2	2	2	2	1	1	2	1	1	1	1	2	1	1	2	2	2	.	.	2	1	1	2	1	1	SIR	.	7	MALE	MIDAGE	NNT 1	77
115	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	2	2	2	2	2	.	.	.	.	.	.	SIR	.	7	MALE	MIDAGE	NNT 1	78
116	2	2	.	.	.	1	2	3	.	.	.	.	2	2	3	3	3	2	.	.	.	.	2	2	2	.	.	.	SIR	.	7	MALE	OLD	NNT 1	88
117	3	.	.	.	.	.	3	3	3	.	.	.	.	.	.	.	.	.	2	2	2	2	.	3	.	.	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	1

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
118	.	8	8	8	8	8	.	8	8	.	8	8	8	.	.	.	.	.	.	.	.	.	.	.	.	.	8	8	.	8	8	.	.	.	.	.	.	.	.	.	.	.	.	.
119	1	1	1	1	1	1	1	1	1	1	1	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	2	2	.	2	2	2	2	2	2	2	2
120	8	1	1	1	1	4	.	.	4	.	1	4	1	1	.	.	4	1	1	1	4	1	4	3	3	4	1	1	1	1	1	.	.	2	2	2	2	.	.	.	.	.	.	.
121	.	8	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	1	8	.	.	8	1	4	8	.	.	8	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	2	.	.	2	1	1	1	.	.	.	.	2	2	.	1	1	1	1	1	1	1	1	1
123	2	1	1	1	1	1	4	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	4	2	4	4	1	1	1	1	2	.	1	1	1	1	1	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.
125	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	.	0	0	0	0	0	0	0	0
126	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	1	1	1	1	1	3	1	3	1	1	1	1	1	1	2	.	2	2	1	1	1	.	.	.	.	1	1

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	0	0	0	1	1	1	1	1	0	0	.	.	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	2	2	2	.	2	.	.	.	.	.	.	2	2	2	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0
122	2	2	2	.	2	2	2	1	1	.	.	.	.	2	2	1	.	.	.	.	2	1	.	1	1	2	1	1	1	1	2	1	1	1	.	.	0	0	0	.	.	.	.	.
123	.	.	.	.	1	2	2	2	2	2	.	.	.	.	.	2	2	2	2	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	0	.
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
126	1	1	1	1	.	2	2	2	2	2	.	3	.	3	2	2	2	2	2	.	2	1	1	1	1	.	.	.	.	.	.	.	.	1	1	1	.	1	1	1	1	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1
120	.	.	1	0	0	0	0	0	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	2	2	2
121	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.
122	.	0	.	.	.	.	.	.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	1	2	.	2
123	.	.	.	1	1	.	.	.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	1	.	1	2	1
124	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	.
126	.	.	.	1	1	1	1	0	1	0	0	0	0	0	.	.	.	.	.	1	0	0	0	0	.	0	0	0	0	1	.	0	.	1	0	0	0	0	0	.	.	1	2	2

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEARX7	CARD7	SEX7	AGE7	SITE7	SPECID7
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	4	7	?SEX	CHILD	NNT 2	2
119	1	2	2	2	2	2	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	3
120	2	.	.	.	.	.	2	.	2	2	.	.	.	2	2	2	.	2	.	.	.	.	2	2	2	2	2	.	UNL	.	7	FEMALE	MIDAGE	NNT 2	4
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	0	.	.	UNL	4	7	?SEX	CHILD	NNT 2	5
122	2	3	2	2	2	2	2	2	2	2	1	.	1	1	2	1	1	.	.	.	.	2	2	1	.	.	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	9
123	2	2	.	.	.	2	2	2	2	2	1	1	1	2	2	1	2	2	.	.	.	.	.	2	2	.	2	.	UNL	.	7	MALE	MIDAGE	NNT 2	10
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	UNL	.	7	?SEX	ADULT	NNT 2	18
125	1	1	1	2	2	1	1	1	1	1	1	0	0	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	UNL	.	7	FEMALE	YG ADULT	NNT 2	20
126	1	1	2	2	.	2	2	1	1	2	1	1	.	2	2	2	1	2	.	2	.	2	1	2	1	2	2	.	UNL	.	7	FEMALE	MIDAGE	NNT 2	22

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
127	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	4	1	1	1	4	.	2	4	1	1	1	1	.	1	1	1	1	1	1	1	1	1	1	1
128	.	.	.	.	.	.	.	1	1	1	.	.	.	.	8	.	.	7	1	.	.	.	.	.	.	.	.	.	.	1	7	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	3	.	.	.	.	.	.	.	.	.	.	.	.
130	1	1	1	1	1	2	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	2	2	2	4	4	2	4	4	4	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	2	.	.	.	.	.	7	.	.	.	.	2	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	1	1	1	1	1	2	2	2	2	2	2	1	2	1	1	6	1	1	1	2	4	4	2	2	2	2	.	.	.	.	.	.	0	2	2	0	0	.	.	.	.	.	.	0
133	8	1	1	1	1	1	1	.	2	1	1	1	1	1	1	8	7	1	1	1	1	2	2	2	1	1	1	1	1	1	1	7	.	1	1	1	1	1	.	.	.	0	0	1
134	.	8	1	.	.	.	.	.	.	.	1	.	.	1	8	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	3	4	4	1	1	2	.	.	4	4	4	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
127	1	1	1	.	1	1	1	1	.	1	1	1	.	.	.	.	1	1	1	1	.	1	.	2	2	.	.	.	.	1	1	2	2	1	1	.	0	1	1	0	0	.	1	1
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	2	2	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	.	0	0	0	0	0	0	0	0	0
133	1	1	1	.	.	1	1	1	1	.	.	.	1	1	1	1	1	1	1	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	0	.	.	1	1	1	0	.	.	.
134	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	2	2	1	1	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

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OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
127	1	.	.	0	0	1	1	0	.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	2	2	1
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.
129	.	.	.	2	2	3	3	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.
130	0	0	0	0	.	.	.	2	.	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	0	0	0	1	1	2	1
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.
132	0	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	0	1	1	1
133	0	0	0	1	1	0	0	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	1	1
134	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
135	.	.	2	2	3	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	0	0	0	.	.	.	0	0	0	.	1	0	.	.	.	.

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEARX7	CARD7	SEX7	AGE7	SITE7	SPECID7
127	1	2	2	2	2	2	2	2	1	2	1	.	1	2	2	1	.	2	2	2	.	.	.	.	1	2	2	1	UNL	.	7	MALE	MIDAGE	NNT 2	23
128	.	.	.	0	0	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	UNL	4	7	MALE	CHILD	NNT 2	25
129	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	2	1	.	UNL	.	7	MALE	MIDAGE	NNT 2	26
130	1	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	OLD	NNT 2	27
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	UNL	4	7	MALE	CHILD	NNT 2	29
132	1	.	.	.	.	.	.	1	.	1	1	.	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	YG ADULT	NNT 2	32
133	1	1	2	.	.	2	2	1	1	1	1	.	.	1	2	1	1	.	.	.	2	2	1	1	1	2	1	.	UNL	.	7	MALE	ADOL	NNT 2	33
134	.	.	.	.	.	.	0	.	.	1	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	UNL	4	7	MALE	CHILD	NNT 2	34
135	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	OLD	NNT 2	39

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
136	3	1	1	1	1	1	1	1	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	4	4	.	4	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
137	6	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3	4	1	.	.	.	3	.	1	4	.	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.
140	3	1	1	1	2	3	3	2	2	4	3	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	2
141	1	1	1	1	2	.	.	1	1	.	.	.	.	1	1	1	.	1	3	1	1	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.
142	1	1	1	1	4	4	1	4	4	1	4	1	1	1	1	3	1	1	4	1	1	.	.	.	1	1	1	1	1	1	1	3	.	.	.	.	.	.	.	.	.	.	.	.
143	6	1	1	1	1	1	1	1	2	2	1	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	.	.	1	1
144	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	7	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	.	1	.	1	1	1	1

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
136	.	.	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.
137	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.
140	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.
141	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	.	.	.	.	.	.	.	.	.
143	1	1	1	.	1	1	1	1	1	2	2	.	2	2	2	1	1	1	1	1	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	.
144	2	2	2	1	2	2	2	2	2	2	.	.	.	1	2	2	2	2	2	1	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
136	.	.	.	.	.	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	1	2	1
137	.	.	.	0	0	0	0	0	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	.	1	2	1
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1
141	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
142	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	.	.	.	.	.
143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	1	1
144	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEARX7	CARD7	SEX7	AGE7	SITE7	SPECID7
136	1	1	.	.	.	.	1	1	1	2	1	1	1	1	2	1	1	1	.	.	.	.	1	1	1	2	1	1	UNL	.	7	MALE	MIDAGE	NNT 2	41
137	1	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1	1	1	2	2	.	2	2	1	1	2	1	1	UNL	.	7	FEMALE	MIDAGE	NNT 2	43
138	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	MIDAGE	NNT 2	43A
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	3	.	.	.	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	47
140	.	.	.	.	.	.	.	2	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	MIDAGE	NNT 2	48
141	.	.	.	2	2	.	.	.	.	1	1	1	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	OLD	NNT 2	49
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	OLD	NNT 2	52
143	1	1	1	2	.	.	1	1	1	1	1	.	0	1	2	1	1	1	1	.	2	1	1	1	1	2	1	0	UNL	.	7	MALE	MIDAGE	NNT 2	55
144	1	.	1	.	1	1	1	1	1	1	1	1	0	1	1	1	1	1	.	.	.	1	1	1	1	1	1	0	UNL	.	7	MALE	YG ADULT	NNT 2	56

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ULM3	ULM2	ULM1	ULP4	ULP3	ULC	ULI2	ULI1	URI1	URI2	URC	URP3	URP4	URM1	URM2	URM3	LLM3	LLM2	LLM1	LLP4	LLP3	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRP3	LRP4	LRM1	LRM2	LRM3	CALULM3	CALULM2	CALULM1	CALULP4	CALULP3	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURP3
145	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	4	1	3	2	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1	.	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	1	1	1
147	.	.	.	3	3	3	3	3	3	3	3	3	3	.	.	.	.	.	.	.	.	3	3	3	3	3	3	3	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
148	.	1	1	1	4	4	4	4	.	4	4	4	4	4	4	.	1	1	1	1	4	4	4	4	3	4	3	4	4	1	1	1	.	2	2	.	.	.	.	.	.	.	.	.
149	1	4	1	4	4	1	1	2	1	4	1	1	1	4	4	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	.	1	.	.	1	1	.	1	.	1	1
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	2	1	1	1	1	1	2	2	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	1	.	1	2	1	1	1	1	2	1	1	1	1	1	.	.	.	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.	2	.	2	.
152	1	1	1	1	1	1	2	2	2	1	2	1	1	1	1	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	1
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	4	2	1	1	1	1	2	1	1	1	1	1	3	2	.	.	.	.	.	.	.	.	.	.	.	.
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	2	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
155	3	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	1	1	3	1	1	1	.	.	.	.	.	.	.	.	.	.	.	2	2	1	1	1	1	1	.	.	.	.
156	7	1	1	1	1	1	4	1	1	3	3	3	1	1	1	7	1	1	1	2	1	1	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	.	1	1	.	.	.
157	.	.	.	.	.	.	.	.	2	2	2	4	1	1	1	2	.	.	2	1	2	1	2	2	2	2	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
158	.	.	.	.	.	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1
159	2	1	1	1	1	2	2	2	2	2	2	4	2	1	1	1	3	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	.	1	1	1	1	.	.	.	.	.	.	.
160	7	1	1	1	1	1	4	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	4	2	4	1	1	1	1	1	1	.	0	0	0	0	0	.	.	.	.	0	0
161	.	.	8	.	.	.	.	8	8	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	.	.	.	1	1	1	1
163	3	1	1	1	1	1	2	1	1	4	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	4	1	1	1	1	1	1	.	2	2	2	2	2	.	1	1	.	1	2
164	.	.	1	1	1	1	2	.	2	2	.	.	.	2	1	2	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	3	.	.	1	1	2	1	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	3	1	1	4	4	4	4	2	1	1	1	1	1	1	1	.	1	1	1	1	1	2	4	4	4	4	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
168	1	1	1	1	.	1	.	.	2	2	2	1	1	1	1	1	1	1	1	4	.	.	.	.	1	1	1	1	1	1	1	.	1	1	1	1	.	.	.	.	.	.	.	.
169	.	1	1	1	1	1	2	2	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	0	0	0	0
170	.	.	.	.	.	.	.	4	4	1	1	1	1	1	1	7	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7	.	.	.	.	.	.	.	.	1	1	1	1
171	1	3	1	1	1	1	1	1	2	4	1	1	1	1	3	3	3	1	1	1	1	1	4	4	4	4	1	1	1	1	4	3	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	1	1	1	1	2	2	2	1	2	2	2	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
173	.	1	1	1	1	1	1	2	1	1	1	1	1	1	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	0	0	0	.	0	0	0	0

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	CALURP4	CALURM1	CALURM2	CALURM3	CALLLM3	CALLLM2	CALLLM1	CALLLP4	CALLLP3	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRP3	CALLRP4	CALLRM1	CALLRM2	CALLRM3	RESULM3	RESULM2	RESULM1	RESULP4	RESULP3	RESULC	RESULI2	RESULI1	RESURI1	RESURI2	RESURC	RESURP3	RESURP4	RESURM1	RESURM2	RESURM3	RESLLM3	RESLLM2	RESLLM1	RESLLP4	RESLLP3	RESLLC	RESLLI2	RESLLI1
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	1	1	1	.	.	1	1	.	.	.	1	1	1	1	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	0	0	1	.	.	0	.	0	1	1	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	.	.	2	2	2	1	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.
149	1	.	.	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	.	.	0	.	.
151	2	2	2	2	.	2	2	1	.	.	.	.	.	.	1	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	2	2	1	1	.	3	2	1	.	.	.	.
152	1	1	1	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	.	.	.	.	.	0	1	1	1	.	0	0	0	0	0	0	.	.
153	.	.	.	.	.	.	.	.	2	2	2	2	.	2	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	.	.	.	.	1	1	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	1	1	2	2	1	.	.	.	.	.	.	.	.	.	.	1	1	.	1	1	1	.	.
156	2	2	1	1	.	.	1	.	1	1	.	.	2	2	2	2	1	1	1	.	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	.	0	0	.	.	0	.	.
157	0	0	0	.	.	.	.	1	.	1	.	.	.	.	1	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	1	1	1	.	1	1	.	.	.	.	.	.	.	.	.	.	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	0	1	0	.	0	0	0	0	.	.	.
160	0	0	0	0	1	1	1	1	0	0	0	.	.	.	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	1	1	1	.	.	1	1	1	.	1	1	1	.	.	.	.	1	1	1	1	.	.	.	0	0	.	.	.	.	0	0	0	0	.	.	.	0	0	0	0	.	0	0	0
163	2	2	2	.	2	2	2	2	2	2	2	.	.	.	2	2	2	2	2	2	3	3	2	2	2	1	.	.	1	2	2	2	2	2	3	.	3	3	3	2	2	1	1	1
164	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	2	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	.
168	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	1	1	1	1	1	1	1	1	0	0	0	0	.	.	.	.
169	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
170	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	1	1	1	1	.	.	.	1	2	1	1	1	1	1
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	1	1	0	0	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.
173	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	RESLRI1	RESLRI2	RESLRC	RESLRP3	RESLRP4	RESLRM1	RESLRM2	RESLRM3	ABCULM3	ABCULM2	ABCULM1	ABCULP4	ABCULP3	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURP3	ABCURP4	ABCURM1	ABCURM2	ABCURM3	ABCLLM3	ABCLLM2	ABCLLM1	ABCLLP4	ABCLLP3	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRP3	ABCLRP4	ABCLRM1	ABCLRM2	ABCLRM3	ATTULM3	ATTULM2	ATTULM1	ATTULP4
145	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.
146	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	0	.	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	0	0	.	.	.	.	.	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	.	0	.	0	0	0	0	0	.	2	2	2
149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	.	2	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	.	0	0	0	0	0	0	.	0	0	0	.	0	.	.	.	.	.	.	.	.	0	0	.	.	.	.
152	.	.	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	1	1	2	1
153	.	1	1	1	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	.	0	.	.	.	.
154	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.
155	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	1	0	0	0	.	.	.	.	.	.	.	.	.	.	.	2	2	2
156	.	.	.	1	1	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	.	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
157	.	0	0	0	0	0	0	1	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	2	2	2
160	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	1	1
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	0	0	0	0	.	.	.	0	0	.	0	0	.	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	0	0	0	0	1	1	1	1
163	1	1	1	1	2	3	3	3	1	0	0	0	0	0	.	.	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	2	2	2
164	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.	.	0	.	.	.	.	.	1	0	0	0	.	.	.	.	.	.	.	.	.	.	3	2
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	1	1	1	.	0	0	0	0	0	0	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	.	2	3	.
168	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	2
169	.	.	.	.	.	.	.	.	.	0	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
170	.	.	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.
171	1	1	1	1	1	1	1	.	0	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	.	3	2
172	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2
173	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2

DENTAL PATHOLOGY IN NORTHEASTERN THAILAND PERMANENT TEETH

OBS	ATTULP3	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURP3	ATTURP4	ATTURM1	ATTURM2	ATTURM3	ATTLLM3	ATTLLM2	ATTLLM1	ATTLLP4	ATTLLP3	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRP3	ATTLRP4	ATTLRM1	ATTLRM2	ATTLRM3	INSCODE7	YEAREX7	CARD7	SEX7	AGE7	SITE7	SPECID7
145	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	UNL	.	7	FEMALE	YG ADULT	NNT 2	59
146	.	.	2	2	2	2	1	1	1	2	1	.	1	1	2	.	.	.	1	2	2	1	1	1	1	2	1	.	UNL	.	7	FEMALE	YG ADULT	NNT 2	60
147	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	OLD	NNT 2	61
148	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	1	.	.	.	.	.	.	.	.	.	2	2	1	UNL	.	7	MALE	MIDAGE	NNT 2	62
149	.	1	1	.	2	.	2	1	1	.	.	1	1	1	1	1	1	1	2	.	2	2	1	1	1	2	1	1	UNL	.	7	MALE	MIDAGE	NNT 2	64
150	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	.	1	1	1	2	2	.	.	1	1	2	2	1	UNL	.	7	FEMALE	MIDAGE	NNT 2	68
151	.	.	.	.	2	.	2	.	2	3	2	1	.	2	2	1	.	2	.	.	.	.	2	.	.	.	2	1	UNL	.	7	MALE	OLD	NNT 2	70
152	1	2	.	.	.	1	.	1	1	2	1	.	1	1	2	1	1	1	2	2	2	2	2	1	1	2	1	1	UNL	.	7	FEMALE	MIDAGE	NNT 2	71A
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	3	3	.	3	2	2	2	2	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	71B
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	UNL	.	7	MALE	ADULT	NNT 2	73
155	2	3	3	3	.	.	.	.	.	.	.	.	2	2	.	3	2	2	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	73A
156	1	1	.	2	1	.	.	.	1	1	1	0	.	1	1	.	1	1	.	.	2	1	1	1	1	1	1	0	UNL	.	7	FEMALE	ADOL	NNT 2	74
157	.	.	.	.	.	.	.	.	1	2	1	.	.	.	.	1	.	2	.	.	.	.	2	1	1	2	1	1	UNL	.	7	FEMALE	YG ADULT	NNT 2	75
158	.	.	.	.	2	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	UNL	.	7	MALE	MIDAGE	NNT 2	76
159	2	.	.	.	.	.	.	.	.	2	2	1	.	2	2	.	.	.	.	.	.	.	.	.	.	2	2	1	UNL	.	7	FEMALE	MIDAGE	NNT 2	78
160	1	1	.	.	.	.	1	1	1	1	1	1	1	1	2	1	1	1	2	.	.	.	1	1	2	2	1	1	UNL	.	7	FEMALE	YG ADULT	NNT 2	79
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	4	7	FEMALE	CHILD	NNT 2	81
162	1	1	2	2	2	2	1	1	1	1	1	0	0	1	2	1	.	2	2	2	2	2	2	.	1	2	1	1	UNL	.	7	FEMALE	YG ADULT	NNT 2	83
163	2	2	.	2	2	.	2	2	2	2	2	.	2	2	2	3	2	2	2	.	.	.	2	2	2	2	2	2	UNL	.	7	MALE	OLD	NNT 2	89
164	2	3	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	OLD	NNT 2	90
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	MALE	ADULT	NNT 2	95
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	ADULT	NNT 2	98
167	.	.	.	.	2	2	2	1	2	2	1	.	.	2	3	2	2	.	.	.	.	.	2	2	1	2	2	1	UNL	.	7	FEMALE	MIDAGE	NNT 2	103
168	.	2	.	.	.	.	.	1	1	2	1	1	1	1	2	.	.	.	.	.	1	1	2	1	1	2	1	.	UNL	.	7	MALE	MIDAGE	NNT 2	110
169	1	1	.	.	2	1	2	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	YG ADULT	NNT 2	114
170	.	.	.	.	1	1	1	1	1	1	1	.	.	1	1	1	1	1	2	2	2	2	1	1	1	2	1	.	UNL	4	7	FEMALE	CHILD	NNT 2	116
171	3	3	2	2	.	.	2	2	2	3	.	.	.	2	2	2	3	3	4	4	4	4	2	3	2	3	.	.	UNL	.	7	FEMALE	OLD	NNT 2	117
172	2	1	.	.	.	2	.	.	.	2	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	UNL	.	7	FEMALE	MIDAGE	NNT 2	124
173	2	2	2	.	2	2	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	.	7	FEMALE	YG ADULT	NNT 2	M125

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
4	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	0	0	0	.	.	.	.	0	.	.	0	.
6	.	0	.	.	.	.	.	0	0	0	.	1	.	0	0	.
7	.	.	.	0	.	.	.	.	.	.	.	0	0	.	.	0
8	.	.	.	.	.	.	.	.	.	.	.	.	6	0	0	0
9	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.

OBS	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3
1	.	.	0	.	.	.	.	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0
3	0	0	0	0	0	0	0	.	.	.	0	.	0	0	0	0
4	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.
6	.	.	0	0	0	1	0	0	0	0	1	1	0	0	.	.
7	.	0	.	0	0	0	.	.	.	.	.	0	0	.	0	0
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
1		0	1A	0	0	0	0	
2								
3								
4	0	0	0	0	0	0		
5					0	2A	2B	
6		0						0
7				0				
8	0	0	0					
9							0	

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4
1											1A	
2									1A	1A	0	0
3			3B				2B	0	0	0	0	0
4									0	0	0	0
5				0			0					
6	0	0		0		0	0				0	0
7				0	0			0		0		0
8					0	0	0	0				
9			0			0					0	

OBS	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3
1				0	0	0	0	0	0			
2	0	0					0	0	0	0	0	1A
3	0	0	0				0	0	0	0	0	0
4												
5										2B	2A	
6	0	0	0	0	0	0	0	0	0	0		
7	0	0						0	0		0	0
8											0	
9					0	0				0		

OBS	PHASE2	ROW	AGECODE	CARCD2	SEX2	AGE2	SITE2	SPECID2
1	6	.	A	2	2	4	BC 1	4
2	6	.		1	1	2	BC 1	5
3	6	.		7	1	2	BC 1	7
4	6	.	E	2	2	1	BC 1	8
5	6	.		2	1	2	BC 1	9
6	6	.		2	3	5	BC 1	10
7	7	.	A	2	2	4	BC 1	11
8	6	.		2	1	2	BC 1	12
9	10	.		2	3	5	BC 1	14

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4
10	.	.	0	1	0	.	0	.	.	.	.	0	1	0	0	.	.	1	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
12	.	0	0	0	0	0	0	0	.	.	.	0	0	0	0	.	0	0	0	0
13	0	1	0	6	6	6	6	6	6	6	0	6	6	6	1	.	0	0	6	6
14	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0
16	.	.	.	0	.	4	1	.	.	.	4	.	.	.	.	.	.	.	0	0
17	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.

OBS	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
10	.	.	.	.	.	.	6	.	.	.	1	.		1C	0	0	0		0	
11	3	.	.	.	.	.	.	.	.	.	.	.								
12	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0
13	6	6	.	.	.	.	6	6	6	6	6	4	0	0	0	0	0	0	0	0
14	.	.	.	.	.	.	.	.	.	.	.	.					0	0		
15	0	3	0	.	0	0	3	0	0	.	.	.	4C	4C	0	0	0	0	0	0
16	0	0	0	.	.	.	1	0	.	.	.	.				0		0	0	3A
17	0	1	0	0	0	0	1	0	0	0	0	0		0	0	0	0	0	0	0
18	.	.	.	.	.	.	.	.	.	.	.	.								

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC
10				0	0	4B	0			1A	0	0	0	0
11												2B	0	1C
12				0	0	0	0		0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14														
15	0	0	4C	0	0	0	4C	0		0		0	0	0
16			0	0	0	0	0				0	0	0	0
17	0	0	0	0	0	0	0		0	0	0	0	0	0
18							0							

OBS	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CAGEDD2	SEX2	AGE2	SITE2	SPECID2
10	0	0	0	0	0	0	0	0	0	0	6	.	B	2	2	1	BC 1	16
11											6	.		2	2	2	BC 1	17
12	0	0	0	0	0	0	0	0	0	0	6	.		2	2	1	BC 1	19
13	0	0			0	0	0	0	0	0	6	.	E	2	1	1	BC 1	20
14											8	.	A	2	1	4	BC 1	22
15	0		0	0	0	0	0	0	0	0	5	.	G	2	1	2	BC 1	23
16	0				0	0	0	0			3	.	I	2	2	3	BC 1	24
17	0	0	0	0	0	0	0	0	0	0	2	.		2	1	5	BC 1	25
18			0								6	.	G	2	2	2	BC 1	28

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0							
20	.	.	.	0	0	.	.	.	.	1	4	0	0	.	.	.	.	0	.	.	4	.	.	.	.	.	4	.	.	.	.	.				0	0		
21	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	0	.	.		1C	0				
22	.	.	.	0	0	4	.	.	.	0	4	1	0	.	0	0	.	.	4	4	0	0	0	.	.	.	0	4	4	0	4	4			0	0	0	0	0
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	0	0	0	0	0							
24	.	.	0	.	.	.	.	.	0	0	0	.	.	0	.	.	.	.	0	.	.	.	0	0	0	0	.	.	.	0	.	.			0				
25	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	0	0	0	0	1	0	0	0	0	1	0	0	0	0	.	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	1	.	.	.	.	1	0	0	0	0	0	0	0	0	0	0	0	0
27	.	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	.	.	.	.	0	.	0	0	0	0		0	0	0	0	0	

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
19																								0	0	4	.	I	2	2	3	BC 1	31
20			0	0	0	0					2B	0		2B					0	0	0	0	0		1C	2	.	G	2	2	2	BC 1	33
21														0	0								0			2	.		2	2	2	BC 1	33A
22			0	0	0	0	0	2B				0	0	0	0	0				0	0	0	0	0	1A	2	.	F	2	2	2	BC 1	34
23											0	0	0	0							0	0	0	0	0	5	.	F	2	1	2	BC 1	35
24							0					0				0	0	0	0				0			2	.		2	1	5	BC 1	38
25	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0		1	.	E	2	2	1	BC 1	41
26	0	0	0	0	0	0	0	0		0	0	0	0	0	0					0	0	0	0	2B	2A	2	.	E	2	1	1	BC 1	43
27	0	0	0	0	0	0	0	0	0	0	0	0	0		0					0		0	0	3A	0	2	.	A	2	2	1	BC 1	45

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4
28	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	0	0	0	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.
31	.	.	.	.	.	1	.	.	.	.	0	0	0	0	.	.	.	0	0	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	1	.	.	0	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
28	0	.	.	.	.	.	.	0	0	0	0	.	0	0	0	0	0	0	0	0
29	.	.	.	.	.	.	.	.	.	.	.	.				0	0	0	0	
30	.	.	.	.	.	.	.	.	.	.	.	.		0	0	0				
31	.	.	.	.	.	.	.	.	.	.	0	.				0	0	0	0	0
32	.	.	.	0	0	.	.	.	.	0	.	.								
33	.	.	0	5	.	.	.	.	.	.	.	.								
34	.	.	.	.	.	.	.	.	.	.	.	.								
35	.	.	.	.	.	.	.	.	.	.	.	.								
36	.	.	.	.	0	0	.	.	.	.	.	.	0	0				0		

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3
28	0	0	0	0	0	0	0	0	0	0	0	0	0							0	0	0	0	
29																								
30					0	0	0																	
31			0	0	0	0				0	0	0	0	0				0		0			0	
32																								
33															0									
34	0	0	0	0	0	0		0			0	0		0				0	0	0	0			
35																								
36																	0	0						

OBS	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2		SPECID2
28	2	.	C	2	1	1	BC	1	47
29	1	.	F	2	2	2	BC	1	48
30	10	4	A	2	2	1	BC	2	1
31	10	6	E	2	1	1	BC	2	2
32	9	6		2	1	5	BC	2	5
33	9	6	F	2	1	2	BC	2	6
34	10	5	H	2	1	3	BC	2	7
35	10	4	F	2	2	5	BC	2	8
36	9	5	E	2	2	1	BC	2	9

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.								
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	.	0	0	0	.	.								
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.								
40	0	0	0	0	4	0	4	0	0	4	0	4	0	0	0	0	0	0	0	0	.	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0	0	0	0	0	0	0
42	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	0	.	.	.	.	.	.	.								
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0		0	0	0			0	
44	.	0	0	.	0	.	.	.	.	.	.	0	.	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0		0	0		0			
45	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.								

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
37															0	0	0	0	0	0	0	0	0		7	4		2	2	2	BC 2	11
38											1A	0	0	0			0	0		0	0	0			7	4	F	2	2	2	BC 2	15A
39																				0	0	0	0		7	7		2	2	1	BC 2	17
40	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	7	4	D	2	2	1	BC 2	19
41	0									1A															7	4	E	2	2	1	BC 2	20
42						0					0						0								6	5		2	2	5	BC 2	21
43					0	0	0	0	0		1C		0						0					0	7	4		2	1	2	BC 2	22
44				0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	4	D	2	1	1	BC 2	24
45		0	0	0	0	0	0																		6	5		2	2	7	BC 2	25A

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
46	.	.	0	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	0	.	.								
47	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1A	1A	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	0	0	0	.	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	.	0	0	0	0	.	.	.	0	.	0	0	.	0	0	0	0	0	.	.	0	.	0	0	0	0	0	0	0	0	0	0		0	0	0	0
51	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1C	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2A	2B	0	0	0	0	0	0
54	.	.	.	0	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	.	.				0				0

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
46																									7	4		2	2	5	BC 2	26
47	0	0	0	0	0	0	1A	1A	1C	1A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	E	2	2	1	BC 2	27
48	0	0	0	0	0												0	0		0	0	0	0		6	5	E	2	2	1	BC 2	28
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	A	2	2	1	BC 2	29
50				0		0	0		0	0	0	0	0			0		0	0	0	0	0	0	0	4	7	G	2	1	2	BC 2	31
51	0	0	0	0	0	0	0	1C	1C	2B	0	0	0	0	0	0	0	0	0	0	0	0	0	1A	5	5	C	2	2	1	BC 2	33
52	0	0	0	0	0	0	0			0	1A	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	C	2	2	1	BC 2	34
53	0	0		0	0	0					1C	0	0	1C			0		0	0	0				4	6	G	2	1	2	BC 2	35
54	0	0	0											0			0	0	0	0	0		2A		7	4	G	2	1	2	BC 2	40

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
55	.	.	.	0	0	0	.	0	.	0	.	1	1	0	.	.	.	0	0	0	0	1	0	0	0	0	1	0	.	0	0	.				0	0	0	5	0
56	0	0	0	0	.	0	.	.	.	.	.	.	0	0	0	.	0	0	0	0	0	4	.	.	.	.	4	4	0	0	0	0	0	0	0	0		0		
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	0	.	.	.				0				
59	0	0	0	0	.	.	.	.	0	0	.	.	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0		0	0	0	0			
60	.	0	0	0	0	1	1	1	1	1	1	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	.		0	0	0	0	0	0	0
61	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.			0					
62	.	.	0	.	.	.	0	0	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.								
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	.	0	.	0	0	0	0	0	0	0	0

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARCD2	SEX2	AGE2	SITE2	SPECID2
55		0	0	0	0	5					2A	2B	0	0	0	0	0	0	0	0		2B	2A		4	5	G	2	1	2	BC 2	45
56					0	0	0		0	0	0	0	0	0					0	0	0	0	0	0	4	6	G	2	2	2	BC 2	46
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	3	5	G	2	1	2	BC 2	47
58																			0		0				3	6	E	2	1	1	BC 2	49
59	0	0			0	0	0	0									0	0	0	0	0	0	0	0	4	6	C	2	1	1	BC 2	50
60	0	0	0	0	0			0	1A	0	0	0	0	0	0	0	0	0	0	0		0	0		4	5	F	2	1	2	BC 2	51
61						0																0			3	5		2	1	5	BC 2	52
62																									4	6		2	2	5	BC 2	54
63	0	0	0	0	0	0	0	0	0	0	0	0	0						0	0	0		0		4	6		2	1	4	BC 2	55

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
64	0	0	0	.	.	.	.	0	.	.	.	.	.	.	.	0	.	.	.	0	0	0	0	.	0	0	0	0	0	.	0	.	0	0	0	0	0	0		0
65	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.					0	0		
66	.	0	0	0	0	1	.	.	1	0	1	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.		0	0	0	0	0		
67	0	1	.	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
68	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			0	0				
69	.	.	0	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.			0					
70	.	0	0	0	0	4	1	1	1	1	4	0	0	0	0	.	.	0	0	0	0	0	1	1	.	1	0	0	0	0	.	.	5	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0	.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	1	0	0	.	0	1	.	0	0	0	0								

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
64								4C				0	0	0	0		0	0	0	0	0		0		5	4	G	2	1	2	BC	2 56
65										0	0	0	0	0	0		0	0	0	0	0	0	0		2	5		2	2	2	BC	2 57
66	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2	5	A	2	3	4	BC	2 58
67	0	0	0	0	0	0	0	0	0	0	0	0	0	1B	0	0	0	0	1B	0	0	0	0	0	5	4	G	2	2	2	BC	2 59
68																									4	4		2	2	2	BC	2 61
69	0					0					0											0			2	6		2	2	5	BC	2 62
70	0	0	0	2B	0	0	0	5		0	0	0	0	0	0	0		0	0	0	0	0			4	4	F	2	1	2	BC	2 65
71		0	0	0	0	0	0	4C	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	3	4	E	2	1	1	BC	2 72
72									0	0	0	0	0	0	0	0		0	0		0	0	0	0	7	5	E	2	1	1	BC	2 73

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.								
74	0	0	0	0	2	2	.	.	.	.	.	2	0	.	0	0	.	0	0	0	2	0	0	0	.	0	0	.	0	0	.	0	1A	0	0	0	0	0	0	0
75	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.			0	0	0	0		
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	0	0	0	0	0	0	.	.	.		0	0				0	0
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	4	.	.	.	.	.	.	.	.	.	.								
78	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	0	.	.	.	.	0	.	.			0					0
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0								
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	0	0	0	0	0	.	.	.	.								
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	6	0	4	.	6	.	6	4	0	0	0	0	0								

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2		SPECID2
73											0	0		0								2B	2A		2	4		2	1	2	BC	2	74
74	0	0		0	0		0	0		1A	1A	0	0	0	0	0		0	0		0	0	5	1A	3	6	C	2	1	1	BC	2	76
75			0	0	0	0	0			0	0	0													3	6		2	2	2	BC	2	79
76	0	0	0	0	0	0	0					0	0	5		0	5	2B	2A					5	7	4		2	1	2	BC	2	2386
77													0	0											M2	.	F	2	2	2	NN	T1	2
78						0					0					0	0					0			M3	.		2	2	5	NN	T1	7
79																		0	0	0	0	0	0	0	M1	.	I	2	2	3	NN	T1	8
80				0	0	0	0		0				0	0	0	0	0	0	0	0				0	M5	.	E	2	1	1	NN	T1	12
81									0	0	0	0	0	0		0		0	0	0	0	0	0	0	XX	.	B	2	1	1	NN	T1	12A

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.
83	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	0	.	.	0	0	.	.	0	.	.	.	.
86	.	.	0	0	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.
88	0	0	0	0	0	0	.	.	.	.	0	0	.	0	0	.	0	0	0	0
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
90	0	0	0	0	0	0	.	0	.	.	0	0	0	0	0	0	0	0	0	0

OBS	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
82	.	.	.	.	.	.	.	.	.	.	.	.							
83	.	.	.	.	.	.	.	.	.	.	.	.	0						
84	.	2	.	.	.	0	2	.	.	.	.	0							
85	.	.	.	.	.	.	.	.	.	.	.	.							
86	.	0	.	.	.	.	0	0	.	.	.	.			0	0	0		
87	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0
88	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
89	.	.	.	.	.	.	.	.	0	1	0	0							
90	0	0	.	.	0	0	0	.	0	0	0	0	0	0	0	0	0	0	

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
82											0															M4	.	D	2	1	1	NN	T1 16
83																									0	M4	.		2	2	2	NN	T1 17
84						0									0			0	0	0				0	0	M4	.	E	2	2	2	NN	T1 18
85		0			0	0			0																	XX	.	F	2	2	2	NN	T1 20A
86	2B										0				0	0	0	0	0	0	0	0		0		M4	.	F	2	1	2	NN	T1 22
87	0	0	0	0	0	0	0	0	0																	M5	.	C	2	2	1	NN	T1 23
88				0	0		0	0		0	0	0	0	0				0	0	0	0	0	0	0	0	M3	.	F	2	2	2	NN	T1 24
89																						0	0	0	0	M1	.		2	2	7	NN	T1 25B
90	0			0	0	0	0	0	0	0	0	0	0	0	0			0	0	0		0	0	0	0	E3	.	D	2	1	1	NN	T1 26

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
91	0	0	1	0	1	1	1	0	0	1	1	0	0	0	0	.	.	0	0	.	.	.	.	.	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0
92	.	0	0	0	0	.	.	.	.	.	.	0	0	0	0	0	.	0	0	.	0	0	.	.	.	.	.	0	0	0	0	.		0	0	0	0		
93	6	6	6	6	6	0	0	0	.	.	0	6	6	6	6	6	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.							
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.							
97	.	.	0	0	0	0	0	0	0	.	.	.	.	0	.	.	0	.	0	0	0	.	0	0	0	0	.	0	0	0	.	.			0	0	0	0	0
98	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0							
99	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.							

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2		SPECID2
91	0	0	0	0	0	0	0	0			0	0						0	0	0	0	0	0	0	0	M2	.	C	2	2	1	NN	T1	28
92					0	0	0	0	0		0	0		0	0						0	0	0	0		M1	.	B	2	2	1	NN	T1	30
93	0			0	0	0	0	0	0	0	0	0	0	0											0	M5	.	C	2	2	1	NN	T1	31
94		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M5	.	F	2	1	2	NN	T1	34
95																										M5	.		2	3	5	NN	T1	36
96																				0	0	0				M8	.	I	2	2	3	NN	T1	40
97	0	0					0			1A		0	0	0		0	0	0	0		0	0	0			M8	.		2	2	2	NN	T1	41
98						0	0	3A	0	0	0	0	0	0	0					0	0	0	0	0	0	M8	.		2	2	2	NN	T1	42
99					0	0	0	0																		XX	.		2	1	2	NN	T1	42I

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
100	.	0	0	0	0	0	.	.	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	.		0	0	0	0	0	0
101	.	.	.	.	1	1	.	.	0	.	.	.	.	1	.	.	.	.	6	.	.	.	1	.	.	1	.	.	.	0	.	.							
102	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.							
103	.	.	0	0	0	.	.	.	0	0	.	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	.	0	.	1	.			0	2B	0		
104	.	4	.	.	.	4	.	.	0	0	4	.	4	.	4	.	4	4	4	4	.	.	.	.	.	.	.	.	4	4	4	4		1A	2B	0	0	0	
105	.	1	1	1	1	.	.	.	.	1	.	1	1	1	1	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	.		0	0	0	0		
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.							
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0		0	0		
108	.	.	.	.	.	.	.	.	.	.	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.							

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARCOD2	SEX2	AGE2	SITE2		SPECID2
100	0	0	0	0	0	0	0	0		5	0	0	0	0	0	0	0	0	0	0		0	0	0		M7	.	E	2	2	2	NN	T1	43
101		0					0					0				0			0				0			M7	.		2	1	5	NN	T1	44A
102																										M7	.		2	1	5	NN	T1	46
103		0	0		0	0	0	2B	5	5	2B	0	0	0	0	0	0	0	0	0		2B		2B	5	M8	.	F	2	2	2	NN	T1	47
104		0	0	0		0	0	2B		0	0	0	0		0				0	0	0	0	0	0	0	M4	.	E	2	1	2	NN	T1	48
105			0		0	0	0	0		0	0	0	0	0	0					0	0	0	0	0	0	M3	.	E	2	1	2	NN	T1	55
106							0																0			M5	.		2	2	5	NN	T1	58
107			0	0		0				0			0									0	0	0	0	M2	.	F	2	2	2	NN	T1	59
108				0	0	0	0	0	5																	XX	.	H	2	2	3	NN	T1	62

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2	CARIULI1
109	6	6	6	6	6	0	.	0	1	1	0	1	6	6	6	0	0	6	6	6	6	6	6	.	.	6	6	1	6	0	.	.	0	0	0	0	0	0		0
110	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.					0		0	
111	0	0	.	0	0	4	.	1	1	.	4	0	0	0	0	0	0	0	1	0	1	4	.	.	.	.	4	1	0	1	0	0	0	0	0	0	0	0	0	0
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	.	.								
113	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.								
115	.	.	.	.	0	0	.	.	.	0	0	0	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0	.	.	.					0	0		
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.				0	0			
117	.	0	0	.	.	0	.	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	.	.								

OBS	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
109	0	0	0	0	0	0	0	0	3B	0	0	0	0	0	0			0	0	0	0	1A	1A	0	M3	.	C	2	2	1	NN	T1 63
110				0									0	0	0				0	0					M4	.	I	2	1	3	NN	T1 65
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M2	.	B	2	1	1	NN	T1 67
112															0	0	0	0				0			M3	.		2	2	5	NN	T1 74
113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	1A	0	M2	.	F	2	1	2	NN	T1 77
114							0							0	0	0	0	0							M4	.	G	2	1	2	NN	T1 78
115		0	0	0					0	1C	0	0	0	0					0	2B	2A				M1	.	H	2	1	3	NN	T1 88
116			0	0	0										0	0	0	0		2B					M6	.	G	2	1	2	NN	T2 1
117																									M6	.		2	3	5	NN	T2 2

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4
118	0	.	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.
119	.	0	0	0	0	.	.	.	.	.	0	.	0	0	.	.	.	0	0	0
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.
121	0	0	.	0	0	0	0	0	0	0	4	0	0	0	0	.	0	0	0	0
122	.	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0
126	.	0	0	0	0	0	0	1	0	0	5	0	0	0	0	.	0	0	0	0

OBS	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
118	.	.	.	.	.	.	.	.	.	.	.	.	0		0	0	0	0	0
119	.	0	.	.	.	.	4	0	0	0	0	.		0	0	0	0		
120	.	.	.	0	.	.	.	.	.	0	.	.							
121	0	.	.	.	.	0	0	0	.	.	.	.	0	0	5	0	0	0	0
122	0	0	.	.	.	.	.	0	0	0	0	.		0	0	0	0	0	
123	.	.	.	.	.	.	.	.	.	.	.	0							
124	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0
125	.	0	.	0	.	0	0	0	0	0	0	0		0	0	0	0	0	0
126	.	4	0	0	.	.	.	.	0	0	0	0		0	0	0	0	0	0

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1
118	0	0	0	0	0	0											
119				0		0	0				0	0	0		0		
120												0					0
121	0	0	0	0	0	0	0	0		0	0	0	0	0			
122			0	0	0	0	0	0	0	0	0	0	0	0	0		
123																	
124	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	1C	0	0	0	0	0	0	0		0	0	0	2A	0		0
126	0	0	0	0	0	0	0	0		0	0	0	0		0	0	0

OBS	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
118									M4	.	G	2	1	3	NN T2	3
119			0	0	0	0	0		E1	.	F	2	2	2	NN T2	4
120						0			M4	.		2	3	5	NN T2	5
121		0	0	0					M4	.	E	2	1	2	NN T2	9
122				0	0	0	0	0	E3	.	D	2	1	1	NN T2	10
123								0	M4	.		2	3	7	NN T2	18
124	0	0	0	0	0	0	0	0	M1	.	B	2	2	1	NN T2	20
125		0	0	0	0	0	0		M5	.	F	2	2	2	NN T2	22
126					0	0	0	0	M5	.	E	2	1	2	NN T2	23

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
127	.	.	.	.	.	.	.	1	1	1	.	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.							
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.							
129	0	1	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0		
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.							
131	0	0	0	0	0	.	.	.	.	.	.	0	.	0	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0		
132	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	0	0	.	.	.	1	1	1	0	0	0	0	.		0	0	0	0	0	0
133	.	0	0	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.			0				
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.							
135	.	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0		0	0	0	0	0	

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
127	0	0										0											0			M6	.		2	1	5	NN	T2 25
128																			0	0	0	0	0	0		M6	.	E	2	1	2	NN	T2 26
129											0															M6	.	I	2	1	2	NN	T2 27
130																							0			E2	.		2	1	5	NN	T2 29
131					0		0	0		0	0	0														M4	.	C	2	1	1	NN	T2 32
132			0	0	0	0	0	0			0	0	0	0				0	0	0	0	0	0	0		M4	.	A	2	1	4	NN	T2 33
133				0			0								0											M1	.		2	1	5	NN	T2 34
134										0				0	0											M4	.	I	2	2	3	NN	T2 39
135				0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	M1	.	F	2	1	2	NN	T2 41

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
136	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0		0	0	0	0		
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.							
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.							
139	.	0	0	0	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0	0	0			
140	.	0	0	0	.	.	.	.	.	.	.	.	.	0	0	0	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	5	0	0	0			
141	.	.	.	.	.	.	1	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0	0	0			0
142	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0		0	0	0	0	0	0
143	0	0	0	0	0	.	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0		0
144	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.							

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARDD2	SEX2	AGE2	SITE2	SPECID2
136										0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	M6	.	E	2	2	2	NN	T2 43
137										0		0														M6	.		2	2	2	NN	T2 43A
138														0						0						M4	.	G	2	1	2	NN	T2 47
139					0	0	0	0																		M6	.	F	2	2	2	NN	T2 48
140	0	0					0	0	0		0		0	0												M5	.	I	2	1	3	NN	T2 49
141			0		0	0	0	0		0	0		0					0	0	0	0	0	0	0		E3	.	H	2	2	2	NN	T2 52
142	0			0	0	0	0	0		0	3A	0	0	0	0	0		0	0	0	0	0	0	0	0	M4	.	E	2	1	2	NN	T2 55
143		0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	M6	.	C	2	1	1	NN	T2 56
144					0	0																	3A			M5	.	B	2	2	1	NN	T2 59

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
145	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	.	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	.							0
146	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	0	0	0		0	0	0			
147	0	.	0	.	.	4	0	.	0	.	4	0	0	0	.	0	0	0	0	0	0	4	.	.	0	0	4	0	0	0	0	0	0		0			0	0
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	0	0	0	0	0	.	.	0	0	0	0	0							
149	.	.	.	.	.	.	.	.	0	.	0	.	0	0	0	0	.	0	0	0	0	0	.	.	.	.	0	.	.	.	0	0							
150	0	0	0	0	0	0	.	.	.	0	.	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	0	0	0	0	0	.	.							
152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0							
153	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.		0	0	0	0	0	0

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARCD2	SEX2	AGE2	SITE2	SPECID2
145	0	0	0	0	0	0	0	0		0	0	0				0	0	0	0	0	0	0	0	0		M6	.	C	2	2	1	NN	T2 60
146										0	0	0	0										0	0	0	E1	.	G	2	1	2	NN	T2 62
147		0		0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	M1	.	E	2	1	2	NN	T2 64
148										0	0	0		0	0	0	0	0			0	0	0	0	0	M6	.	G	2	2	2	NN	T2 68
149		0		0		0	0	0	0		0	0	0	0	0					0				0	0	M6	.	I	2	1	3	NN	T2 70
150			0		0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M1	.	E	2	2	2	NN	T2 71A
151												5		0	0	0	0		0	0	0	0	0			M1	.		2	1	2	NN	T2 71B
152																						0	0	0	0	M1	.		2	1	7	NN	T2 73
153	0									0	0		0	0	2A											M1	.		2	1	2	NN	T2 73A

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4
154	0	0	0	0	0	0	.	0	0	.	.	.	0	0	0	0	0	0	0	.
155	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0
156	.	.	.	.	.	.	.	.	0	0	.	0	.	.	.	.	.	.	.	.
157	.	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	.	0	0	.
158	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0
159	.	.	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	0	.
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	.	0	0	0	0	0	.	0	0	0	0	0	0	0	0	.	0	0	0	0
162	.	.	0	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.

OBS	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
154	0	4	.	.	0	0	4	0	0	0	0	.	0	0	0	0	0	0	
155	.	0	.	.	.	.	0	0	0	0	0	0							
156	.	.	.	.	.	.	0	.	.	.	.	.							
157	.	.	.	.	.	.	.	.	.	0	0	0		0	0	0	0		
158	0	0	1	.	.	.	1	0	0	0	0	0		0	0	0	0	0	
159	.	.	.	.	.	.	.	.	.	.	.	.							
160	.	0	0	0	0	0	0	.	0	0	0	0	:0	0	0	0	0	0	0
161	0	0	0	.	.	.	0	0	0	0	0	0		0	0	0	0	0	
162	.	.	.	.	.	.	.	.	.	.	.	.			0	0	0	0	

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1
154	0	0				0	0	0	0	0	0	0		0	0		
155						0	0	0					0		0		
156		0	0		0												
157							0	0	0		0	0					
158				0	0	0	0	0	0	0	0	0	0	0	0	0	
159																	
160	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0
161	0	0		0	0	0	0	0		0	0	0	0	0	0	0	
162								0									

OBS	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CARD2	SEX2	AGE2	SITE2	SPECID2
154	0	0	0	0	0	0	0		M1	.	A	2	2	4	NN	T2 74
155			0	0	0	0	0	0	M1	.	B	2	2	1	NN	T2 75
156			0						M1	.	E	2	1	2	NN	T2 76
157						0	0	0	E2	.	F	2	2	2	NN	T2 78
158			0	0	0	0	0	0	E3	.	A	2	2	4	NN	T2 79
159									E3	.		2	2	5	NN	T2 81
160	0	0	0		0	0	0	0	E1	.	D	2	2	1	NN	T2 83
161			0	0	0	0	0	0	E2	.	I	2	1	3	NN	T2 89
162									E3	.	I	2	1	3	NN	T2 90

DENTAL CARIES AND HYPOPLASIA IN PERMANENT TEETH FROM NORTHEAST THAILAND

OBS	HYPOULM3	HYPOULM2	HYPOULM1	HYPOULP4	HYPOULP3	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURP3	HYPOURP4	HYPOURM1	HYPOURM2	HYPOURM3	HYPOLLM3	HYPOLLM2	HYPOLLM1	HYPOLLP4	HYPOLLP3	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRP3	HYPOLRP	HYPOLRM1	HYPOLRM2	HYPOLRM3	CARIULM3	CARIULM2	CARIULM1	CARIULP4	CARIULP3	CARIULC	CARIULI2
163	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	0	.	.	.	.	.	.	.	.	.							
164	.	0	0	.	.	.	.	.	0	0	0	0	0	0	0	.	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0		0	0				
165	0	1	0	1	.	0	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0	0	.	0	0	0	0		0	
166	.	0	0	0	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		5	0	0	0	0	
167	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.							
168	.	.	.	.	.	.	0	0	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	0		0	0	0	0	0
169	.	.	0	0	0	1	.	.	.	0	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.			0	0	0	0	
170	.	0	0	0	0	4	3	.	1	1	1	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		0	0	0	0	0	0

OBS	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURP3	CARIURP4	CARIURM1	CARIURM2	CARIURM3	CARILLM3	CARILLM2	CARILLM1	CARILLP4	CARILLP3	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRP3	CARILRP4	CARILRM1	CARILRM2	CARILRM3	PHASE2	ROW	AGECODE	CASRD2	SEX2	AGE2	SITE2	SPECID2
163												0	0	0	0	0										M5	.		2	2	7	NN	T2 98
164		0	0	0	0	0	0	0		0	0	0	0	0						0	0	0	0	0	0	M1	.	F	2	2	2	NN	T2 103
165					0	0	0	0	0	0	0	0						0	0	0	0	0	0	0		M1	.	E	2	1	2	NN	T2 110
166		0	0	0	0	0	0	1A																		M1	.	A	2	2	4	NN	T2 114
167			0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0		M1	.		2	2	5	NN	T2 116
168	0			0	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0		E3	.	H	2	2	3	NN	T2 117
169			0				0	0	0														0			M4	.	E	2	2	2	NN	T2 124
170		0	0	0	0	0	0																			E1	.	D	2	2	2	NN	T2M125

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	ULM2	ULM1	ULC	ULI2	ULI1	URI1	URI2	URC	URM1	URM2	LLM2	LLM1	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRM1	LRM2	ULI2SS	ULI1SS	URI1SS	URI2SS	LLI2SS	LLI1SS	LRI1SS	LRI2SS	CALULM2	CALULM1	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURM1	CALURM2	CALLLM2	CALLLM1	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRM1	CALLRM2
1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	8	7	7	.	7	8	8	.	.	.	.	.	.	.	7	.	8	8	1	1	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	1	1	1	1	1	.	.	1	1	1	1	1	1	1	1	.	.	1	1	1	1	0	0	1	.	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	.
5	1	1	2	.	.	1	.	.	.	1	1	1	1	.	.	.	.	1	1	1	.	.	2	.	.	.	.	.	0	0	.	.	.	.	.	.	.	1	0	0	1	.	.	.	.	1	0	0
6	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1	1	.	.	.	.	0	1	1	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0
7	.	.	.	.	.	.	.	.	.	.	1	1	2	2	2	2	2	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0
8	.	.	.	.	.	8	8	8	8	8	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	1	1	1	1	3	3	1	1	1	1	1	1	2	2	3	3	1	1	1	1	1	.	.	1	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0
13	7	1	1	1	1	.	1	1	1	7	7	1	1	1	1	1	1	1	1	7	2	1	.	2	2	1	1	2	.	0	0	0	0	.	0	0	0	0	.	0	0	0	0	0	0	0	0	.
14	7	7	7	.	.	.	.	.	7	.	.	7	.	1	1	1	.	.	7	7	.	.	.	.	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	8	8	1	.	1	1	8	8	8	8	8	8	1	1	1	1	8	8	8	1	.	1	1	0	0	0	0	.	.	.	0	.	0	0	.	.	.	.	.	.	0	0	0	0	.	.	.
16	.	.	.	.	.	.	.	.	.	.	8	1	1	.	.	.	1	7	1	8	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	0	.
17	8	8	8	1	.	7	7	8	8	8	8	8	8	7	1	2	2	8	8	8	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	1	1	.	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	0	.	.	.	.	.	.	0	0
19	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	.	.	.	.	.	1	1	1	1	.	.	.	.	1	1	1	1	1	1	1	.	1	1	0	0	0	.	.	.	.	.	.	.
20	1	1	1	2	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	1	1	1	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.
21	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	.	.	1	0	0	1	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0
22	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3	2	1	1	1	1	.	.	1	.	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	1	1	1
23	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	.	2	.	1	.	0	1	0	0	0	.	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0
24	.	.	.	.	.	.	.	.	.	.	8	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	1	1	1	2	2	1	1	1	1	1	1	1	2	2	.	.	.	1	1	1	.	.	1	1	.	.	.	.	0	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	.	.	.	.	.	.	.	.	1	1	0	0	0	0	0	0	0	0	0	0
27	.	.	.	.	.	1	.	1	2	1	1	1	2	2	2	2	2	2	1	1	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0
28	1	1	1	3	3	3	3	1	1	1	1	1	1	2	3	3	3	1	1	1	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0
29	1	1	1	1	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	1	1	0	0	.	.	0	0	1	1	.	.	.	.	.	.	.	.	.	.

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	HYPOULM2	HYPOULM1	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURM1	HYPOURM2	HYPOLLM2	HYPOLLM1	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRM1	HYPOLRM2	CARIULM2	CARIULM1	CARIULC	CARIULI2	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURM1	CARIURM2	CARILLM2	CARILLM1	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRM1	CARILRM2	ABCULM2	ABCULM1	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC
1	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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3	.	.	0	0	0	.	0	0	0	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
5	0	0	.	.	.	0	.	.	.	0	0	0	0	.	.	.	.	0	0	0	0	0	.	.	.	0	.	.	.	0	0	0	0	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	0	0	5	0	0	0	0	5	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.
8	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	0	0	0	0	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	.	.	0	0
13	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	.	0	0	0	0	0	0	0	0	.	0	0	0	0	.	.	0	0
14	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	0	.	0	0	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.
17	.	.	.	0	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	1	0	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	0	0	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	0
19	0	0	5	0	0	0	0	5	0	0	0	0	5	.	.	.	.	.	.	.	1	0	3	0	0	0	0	3	0	3	0	0	3	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.
20	0	0	0	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0
21	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0
22	0	0	0	0	0	5	0	0	0	0	0	0	.	.	.	.	.	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	.	0	0	0	0	0	0	1	1	1	.	.	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	.	.	.	0	0
24	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	0	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	0	0	.	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
27	.	.	.	.	.	1	.	5	.	0	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	0	.	0	.	0	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	0
28	0	0	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.	0
29	0	0	0	0	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	ABCURM1	ABCURM2	ABCLLM2	ABCLLM1	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRM1	ABCLRM2	ATTULM2	ATTULM1	ATTULC	ATTULI2
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	0	0	0	.	.	.	.	0	0	0	2	2	.	.
6	.	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.
7	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
12	0	0	0	0	0	0	.	.	0	0	0	0	1	2	2	1
13	0	0	.	0	0	0	0	0	0	0	0	.	.	1	1	1
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
16	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
18	0	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.
19	0	0	0	0	0	0	0	.	.	.	.	.	1	2	2	2
20	0	0	.	.	.	.	.	.	.	.	.	.	1	1	1	.
21	0	0	0	0	.	.	.	.	.	0	0	0	0	1	1	1
22	0	0	0	0	0	0	.	.	0	0	0	0	1	1	2	2
23	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	0	0	0	0	0	0	.	.	.	0	0	0	1	2	2	.
26	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
27	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.
28	0	0	0	0	0	0	.	.	.	0	0	0	1	2	2	.
29	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1

OBS	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURM1	ATTURM2	ATTLLM2	ATTLLM1	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRM1	ATTLRM2
1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	.
5	.	1	.	.	.	2	2	2	1	.	.	.	.	1	2	2
6	.	.	.	.	.	.	0	0	0	2	1	1	2	0	0	0
7	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	1
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	1	2	1	1	1	1	.	.	.	.	2	2	1	1
13	1	.	1	1	1	.	.	0	1	1	1	1	1	1	0	.
14	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.
15	.	0	0	.	.	.	.	.	.	0	0	0	0	.	.	.
16	.	.	.	.	.	.	.	.	1	.	.	.	1	1	.	.
17	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.
18	.	.	.	2	2	.	1	2	.	.	.	.	.	.	2	1
19	2	2	2	1	1	1	1	2	2	.	.	.	.	.	.	.
20	2	2	1	1	1	1	.	.	.	.	.	.	.	.	.	.
21	2	.	.	.	1	0	0	1	1	1	1	1	1	1	1	1
22	2	2	2	2	1	1	2	2	.	.	.	.	.	2	2	2
23	2	2	2	1	1	1	1	1	1	1	.	2	2	1	1	1
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	2	2	2	2	1	2	2	.	.	.	.	.	2	2	2
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	.	2	.	2	.	1	1	1	.	.	.	.	.	.	1	1
28	.	.	.	2	2	1	1	2	2	.	.	.	.	2	2	1
29	.	.	1	2	1	1	.	.	.	.	.	.	.	.	.	.

OBS	INSCODE3	YEAREX3	PERIOD	CARD3	SEX3	AGEYR3		AGEMO3	SITE3	SPECID3
1	UHM	93	10	3	3	2	YR		BC1	1A
2	UHM	93	10	3	3	6	YR		BC1	14
3	UHM	93	2	3	3	0		4	BC1	34A
4	UHM	93	5	3	3	3	YR		BC1	36
5	UHM	93	2	3	1	6	YR		BC1	38
6	UHM	93	2	3	2	2	YR		BC1	40
7	UHM	93	2	3	1	4	YR		BC1	42
8	UHM	93	2	3	3	0		2	BC1	43A
9	UHM	93	2	3	3	0		3	BC1	46
10	UHM	93	5	3	3	3	YR		BC1	53
11	UHM	93	9	3	3	0		4	BC2	4
12	UHM	93	9	3	1	5	YR		BC2	5
13	UHM	93	10	3	2	2	YR		BC2	8
14	UHM	93	8	3	1	0		4	BC2	12
15	UHM	93	10	3	1	1	YR	5	BC2	13
16	UHM	93	7	3	2	1	YR	5	BC2	14
17	UHM	93	7	3	1	0		3	BC2	16
18	UHM	93	7	3	2	7	YR		BC2	20B
19	UHM	93	7	3	2	4	YR		BC2	26
20	UHM	93	4	3	1	4	YR		BC2	38
21	UHM	93	3	3	2	3	YR		BC2	44
22	UHM	93	3	3	1	6	YR		BC2	52
23	UHM	93	4	3	2	3	YR		BC2	54
24	UHM	93	2	3	1	1	YR	5	BC2	60
25	UHM	93	2	3	2	6	YR		BC2	62
26	UHM	93	3	3	3	3	YR		BC2	70
27	UHM	93	7	3	2	4	YR		BC2	80
28	SIR	93	M5	3	2	7	YR		NNT	1 7
29	SIR	93	M2	3	2	2	YR		NNT	1 29

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	ULM2	ULM1	ULC	ULI2	ULI1	URI1	URI2	URC	URM1	URM2	LLM2	LLM1	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRM1	LRM2	ULI2SS	ULI1SS	URI1SS	URI2SS	LLI2SS	LLI1SS	LRI1SS	LRI2SS	CALULM2	CALULM1	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURM1	CALURM2	CALLLM2	CALLLM1	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRM1	CALLRM2	HYPOULM2
0	1	1	1	4	2	2	2	1	1	1	1	1	2	4	4	4	4	4	1	1	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.	0	0	0
1	.	.	.	.	.	.	.	.	.	.	2	2	2	2	2	2	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	1	.	.	.	3	3	.	.	1	1	1	.	.	3	3	3	3	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	1	0
3	1	.	1	.	1	1	.	1	1	1	.	1	1	4	4	.	.	.	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	0	.	0	0	0	.	0	0	.	.	.	.	.	.	0	0
4	1	1	1	.	.	.	.	.	.	.	1	1	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	0	0	0
5	.	.	.	.	.	2	2	2	1	1	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	1	1	.	2	1	3	3	3	3	3	3	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.
7	.	1	1	.	.	.	.	2	1	1	1	1	1	2	.	.	2	2	1	1	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	0	0	.
8	.	.	7	4	2	.	.	.	.	.	.	4	2	2	2	2	2	7	1	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.
9	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0
0	1	1	1	.	.	.	.	1	1	1	1	.	.	2	3	3	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	0
1	1	1	1	.	1	.	.	.	.	.	7	1	2	1	1	1	1	.	1	8	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	2	2	2	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0
4	1	1	1	4	4	.	1	1	1	1	1	1	1	2	.	4	2	4	1	1	.	.	.	.	.	.	.	.	0	0	0	.	.	.	0	0	0	0	1	1	0	.	.	.	.	.	1	1	0
5	.	.	.	.	.	1	.	.	.	.	8	7	7	2	2	2	2	7	7	8	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.
7	1	1	2	2	2	.	.	2	2	1	1	1	2	2	2	2	2	2	1	1	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	0	0	0
8	1	1	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
9	.	.	.	.	.	.	.	.	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.
0	1	1	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0
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2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	.	.	.	.	.	.	.	.	.	.	8	7	8	.	.	.	.	8	7	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	1	1	1	1	1	.	4	1	1	1	1	1	.	.	.	1	1	2	1	1	1	1	.	.	.	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	.	.	.	0	0	.	0	0	0
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	1	1	1	1	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	0
7	1	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	.	.	.	.	0	0	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0
8	.	8	8	1	.	2	1	8	8	.	.	8	8	7	.	.	7	8	8	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	HYPOULM1	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURM1	HYPOURM2	HYPOLLM2	HYPOLLM1	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRM1	HYPOLRM2	CARIULM2	CARIULM1	CARIULC	CARIULI2	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURM1	CARIURM2	CARILLM2	CARILLM1	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRM1	CARILRM2	ABCULM2	ABCULM1	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURM1	ABCURM2
0	0	0	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.	0	0	0	0	0	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0
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3	.	0	.	0	0	.	0	0	0	.	0	0	.	.	.	.	.	.	0	0	.	0	.	0	0	.	0	0	0	.	0	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	0	0	0
4	0	5	.	.	.	.	.	.	.	0	0	.	.	.	.	.	5	0	0	0	0	0	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.
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7	0	0	.	.	.	.	.	0	0	0	0	5	.	.	.	.	.	0	0	.	0	0	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	0
8	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	0	.	.	.	.	.	.
9	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	.	.	.	.	.
0	0	0	.	.	.	.	5	1	0	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	1	1	0	0	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	0	0
1	0	0	.	0	.	.	.	.	.	0	0	.	0	0	0	0	.	0	.	5	0	0	.	0	.	.	.	.	.	0	0	.	0	0	0	0	.	0	.	.	0	0	.	.	.	.	.	.	.
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3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0
4	0	0	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	0	0	.	.	.	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	0	.	.	.	0	0	0	0
5	.	.	.	.	0	.	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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8	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.
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2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	0	0	0	0	.	.	0	0	0	0	0	.	.	.	0	0	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	.	.	.	0	0	.	0	0	0	0	0	0	.	.	.	0	0	0
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6	0	0	0	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	0	0	0
7	0	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0
8	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	ABCLLM2	ABCLLM1	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRM1	ABCLRM2	ATTULM2	ATTULM1	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURM1	ATTURM2	ATTLLM2	ATTLLM1	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRM1	ATTLRM2	INSCODE3	YEAREX3	PERIOD	CARD3	SEX3	AGEYR3	AGEMO3	SITE3	SPECID3
0	0	0	0	0	0	0	0	0	0	0	1	1	1	.	.	.	.	1	1	1	1	1	.	.	.	.	.	.	1	1	SIR	93	M5	3	1	2 YR		NNT	1 35
1	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M5	3	3	3 YR		NNT	1 36
2	0	.	.	.	.	.	.	.	.	0	2	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	2	SIR	93	M7	3	1	8 YR		NNT	144A
3	.	0	0	0	0	.	.	.	.	0	1	.	1	.	2	2	.	1	1	1	.	1	1	.	.	.	.	.	.	1	SIR	93	M7	3	1	3 YR		NNT	1 46
4	0	.	.	.	.	.	.	.	0	0	1	1	1	.	.	.	.	.	.	.	1	1	.	.	.	.	.	1	1	1	SIR	93	M5	3	1	3 YR		NNT	1 57
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	SIR	93	M5	3	2	7 YR		NNT	1 58
6	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	2	2	.	.	2	.	.	.	.	.	.	1	2	SIR	93	M3	3	2	9 YR		NNT	1 74
7	0	0	0	0	.	.	.	0	0	.	.	1	1	.	.	.	.	.	1	1	1	1	1	.	.	.	.	.	1	1	SIR	93	M1	3	1	3 YR		NNT	1 79
8	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	SIR	93	M1	3	2	1 YR	5	NNT	1 84
9	.	.	.	.	.	.	.	.	0	0	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	UNL	94	M6	3	3	5 YR		NNT	2 2
0	0	.	.	.	.	.	.	.	.	.	1	2	2	.	.	.	.	2	1	1	3	.	.	.	.	.	.	.	.	.	UNL	94	M4	3	3	6 YR		NNT	2 5
1	0	0	.	0	0	0	0	.	0	.	.	1	2	.	2	.	.	.	.	.	.	0	.	2	2	2	2	.	0	.	UNL	94	E1	3	2	2 YR	6	NNT	2 8
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E3	3	1	0'	4	NNT	2 12
3	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	1	1	1	1	1	1	1	2	2	2	2	1	.	1	UNL	94	E1	3	1	2 YR		NNT	2 14
4	0	0	0	0	.	.	.	0	0	0	1	1	1	.	.	.	1	1	1	1	1	1	1	.	.	.	.	.	1	1	UNL	94	M4	3	2	3 YR		NNT	2 15
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94.	E1	3	2	1 YR	5	NNT	2 16
6	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	3	3	UNL	94	M6	3	1	10-11 YR		NNT	2 25
7	0	0	0	0	0	0	0	0	0	0	1	1	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	1	1	UNL	94	E2	3	1	7 YR		NNT	2 29
8	.	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M1	3	1	7 YR		NNT	2 34
9	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	UNL	94	M4	3	2	4 YR		NNT	2 35
0	.	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	UNL	94	E2	3	2	5 YR		NNT	2 36
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E2	3	1	0	3	NNT	2 46
2	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	1	1	1	1	1	1	1	2	2	2	2	1	1	1	UNL	94	E1	3	1	3 YR		NNT	2 72
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E2	3	2	1 YR	5	NNT	2 82
4	0	0	.	.	.	0	0	0	0	0	1	1	1	1	1	.	.	1	1	1	1	1	.	.	.	1	1	.	1	1	UNL	94	E3	3	2	3 YR		NNT	2 81
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Unl	94	E1	3	1	1 YR	5	NNT	2 94
6	.	.	.	.	.	.	.	.	.	.	1	1	2	2	.	.	.	2	1	1	.	.	.	.	.	.	.	.	.	.	UNL	94	E1	3	3	4 YR		NNT	2 96
7	0	0	0	0	0	0	0	0	0	0	1	1	.	1	1	1	1	1	1	1	1	1	1	.	.	.	.	1	1	1	UNL	94	E2	3	1	4 YR		NNT	2112
8	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E2	3	1	0	4	NNT	2121

DECIDUOUS TEETH OBSERVATIONS IN BAN CHIANG AND NON NOK THA SUBADULTS

OBS	ULM2	ULM1	ULC	ULI2	ULI1	URI1	URI2	URC	URM1	URM2	LLM2	LLM1	LLC	LLI2	LLI1	LRI1	LRI2	LRC	LRM1	LRM2	ULI2SS	ULI1SS	URI1SS	URI2SS	LLI2SS	LLI1SS	LRI1SS	LRI2SS	CALULM2	CALULM1	CALULC	CALULI2	CALULI1	CALURI1	CALURI2	CALURC	CALURM1	CALURM2	CALLLM2	CALLLM1	CALLLC	CALLLI2	CALLLI1	CALLRI1	CALLRI2	CALLRC	CALLRM1	CALLRM2	HYPOULM2
9	1	1	2	2	2	2	2	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0

OBS	HYPOULM1	HYPOULC	HYPOULI2	HYPOULI1	HYPOURI1	HYPOURI2	HYPOURC	HYPOURM1	HYPOURM2	HYPOLLM2	HYPOLLM1	HYPOLLC	HYPOLLI2	HYPOLLI1	HYPOLRI1	HYPOLRI2	HYPOLRC	HYPOLRM1	HYPOLRM2	CARIULM2	CARIULM1	CARIULC	CARIULI2	CARIULI1	CARIURI1	CARIURI2	CARIURC	CARIURM1	CARIURM2	CARILLM2	CARILLM1	CARILLC	CARILLI2	CARILLI1	CARILRI1	CARILRI2	CARILRC	CARILRM1	CARILRM2	ABCULM2	ABCULM1	ABCULC	ABCULI2	ABCULI1	ABCURI1	ABCURI2	ABCURC	ABCURM1	ABCURM2
9	0	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0

OBS	ABCLLM2	ABCLLM1	ABCLLC	ABCLLI2	ABCLLI1	ABCLRI1	ABCLRI2	ABCLRC	ABCLRM1	ABCLRM2	ATTULM2	ATTULM1	ATTULC	ATTULI2	ATTULI1	ATTURI1	ATTURI2	ATTURC	ATTURM1	ATTURM2	ATTLLM2	ATTLLM1	ATTLLC	ATTLLI2	ATTLLI1	ATTLRI1	ATTLRI2	ATTLRC	ATTLRM1	ATTLRM2	INSCODE3	YEAREX3	PERIOD	CARD3	SEX3	AGEYR3	AGEMO3	SITE3	SPECID3
9	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	UNL	94	E1	3	1	4 YR		NNT	2125

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
1	.	3	.	.	.	.	.	.	.	243	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	310	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	224	.	221	.	238	.	214	.	.	.	.	.	.	347	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	371	.	364	.	.	356
6	.	.	.	.	.	.	.	.	.	.	.	.	455	.	453	.	395	402	.	385	374	.
7	.	141	307	.	246	.	241	.	.	263	.	238	435	441	433	429	372	374	363	359	361	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M2	4	FEMALE	MIDAGE	NNT1	2
2	.	.	.	.	.	.	.	.	56	53	.	.	.	.	SIR	93	M4	4	FEMALE	MIDAGE	NNT1	4
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E1	4	MALE	ADULT	NNT1	6
4	.	.	.	.	.	.	.	76	19	19	.	221	.	.	SIR	93	M1	4	FEMALE	OLD	NNT1	8
5	.	34	.	35	.	18	70	70	46	44	.	.	.	364	SIR	93	M4	4	FEMALE	ADULT	NNT1	9
6	41	38	45	43	22	21	.	.	56	.	.	.	385	.	SIR	93	M5	4	MALE	ADULT	NNT1	10
7	41	.	46	.	20	.	83	.	55	56	.	241	359	363	SIR	93	M5	4	MALE	MIDAGE	NNT1	12
8	36	.	38	.	18	.	.	.	49	50	.	.	.	.	SIR	93	M4	4	FEMALE	ADULT	NNT1	15
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	4	MALE	YG ADULT	NNT1	16

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	144	.	.	.	258	249	242	242	258	.	239	.	.	.	.	.	.	.	.	.	.	.
13	127	.	.	.	.	.	.	.	.	.	.	.	416	.	412	.	344	345	331	332	334	.
14	.	139	294	.	.	.	.	.	.	258	.	236	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	140	140	.	302	.	.	.	.	.	.	.	.	442	442	440	435	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
10	.	.	.	.	.	.	.	.	50	50	.	.	.	.	SIR	93	M4	4	FEMALE	MIDAGE	NNT1 17
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	4	FEMALE	MIDAGE	NNT1 18
12	.	40	.	44	.	22	.	.	.	.	242	242	.	.	SIR	93	M4	4	MALE	MIDAGE	NNT1 22
13	.	.	.	.	.	.	74	76	.	50	.	.	332	331	SIR	93	M5	4	FEMALE	YG ADULT	NNT1 23
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M3	4	FEMALE	MIDAGE	NNT1 24
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	4	MALE	ADULT	NNT1 25A
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	4	FEMALE	ADULT	NNT1 25B
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E3	4	MALE	YG ADULT	NNT1 26
18	.	.	.	.	.	.	.	.	.	48	.	.	.	.	SIR	93	M3	4	FEMALE	ADULT	NNT1 27

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
19	.	.	.	.	.	238	.	234	257	.	234	.	435	.	427	.	367	.	.	353	.	354
20	134	.	.	288	.	220	33	6	.	244	231	223	.	.	.	.	.	343	.	3	.	.
21	.	.	.	287	235	.	230	.	.	.	.	.	401	398	399	396	.	.	.	.	.	.
22	.	145	324	325	257	.	252	.	281	285	254	255	443	444	440	442	375	379	370	371	371	373
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	145	.	.	230	.	225	.	240	.	218	218	.	430	.	.	.	.	.	.	336	.
25	.	.	.	.	224	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	.	126	297	294	234	.	229	.	.	.	.	230	432	.	425	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	253	.	227	.	.	.	.	.	358	356	348	346	350	351

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
19	34	37	39	39	20	18	77	.	51	52	234	.	353	.	SIR	93	M2	4	FEMALE	YG ADULT	NNT1 28
20	.	.	.	.	.	.	.	.	48	47	6	33	3	.	SIR	93	M1	4	FEMALE	YG ADULT	NNT1 30
21	.	37	.	41	.	18	.	.	.	.	.	230	.	.	SIR	93	M5	4	FEMALE	YG ADULT	NNT1 31
22	41	.	42	.	20	.	83	85	56	57	.	252	371	370	SIR	93	M5	4	MALE	MIDAGE	NNT1 34
23	.	.	.	40	.	21	.	.	.	.	.	.	.	.	SIR	93	XX	4	MALE	ADULT	NNT1 38
24	.	.	.	.	.	.	.	72	49	51	.	225	.	.	SIR	93	M8	4	FEMALE	OLD	NNT1 40
25	36	.	.	.	18	.	.	71	48	50	.	.	.	.	SIR	93	M8	4	FEMALE	MIDAGE	NNT1 41
26	.	.	.	.	.	.	.	.	.	.	.	229	.	.	SIR	93	M7	4	FEMALE	MIDAGE	NNT1 43
27	.	39	.	41	.	17	75	75	47	47	.	.	346	348	SIR	93	M7	4	FEMALE	MIDAGE	NNT1 44

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	130	.	284	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	151	147	298	298	.	236	229	231	254	.	231	.	435	432	433	431	356	357	348	347	351	.
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	271	.	265	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	215	.	210	.	.	.	212	.	.	.	.	.	.	.	.	.	.	.
36	.	144	314	318	.	270	.	.	.	290	.	265	445	444	443	442	395	395	386	383	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNT	RCALNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M7	4	MALE	ADULT	NNT1 45
29	35	.	40	.	17	.	.	.	.	.	.	.	.	.	SIR	93	M8	4	FEMALE	MIDAGE	NNT1 47
30	38	37	42	42	20	20	70	70	48	50	231	229	347	348	SIR	93	M4	4	MALE	MIDAGE	NNT1 48
31	.	22	.	39	.	18	.	.	.	.	.	.	.	.	SIR	93	M8	4	FEMALE	OLD	NNT1 49
32	.	.	.	.	.	.	.	.	.	.	.	265	.	.	SIR	93	M4	4	MALE	MIDAGE	NNT1 50
33	.	.	.	.	.	24	.	.	.	.	.	.	.	.	SIR	93	M8	4	MALE	ADULT	NNT1 51
34	.	38	.	40	.	19	76	.	51	.	.	.	.	.	SIR	93	M3	4	FEMALE	ADULT	NNT1 53
35	35	.	39	.	19	.	.	.	46	48	.	210	.	.	SIR	93	M2	4	FEMALE	OLD	NNT1 54
36	41	40	48	47	21	20	79	79	56	57	.	.	383	386	SIR	93	M3	4	MALE	MIDAGE	NNT1 55

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
37	.	.	270	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	392	.	388	.	.	.	314	.	.	323
39	111	111	268	274	.	.	.	.	.	.	220	.	402	405	399	403	.	.	.	.	.	.
40	138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	151	144	313	311	259	261	252	256	.	.	.	.	431	432	426	427	.	367	.	352	.	.
42	.	.	.	.	255	.	251	.	.	.	.	.	449	.	446	.	380	.	368	.	.	.
43	.	140	302	306	.	245	.	241	.	.	.	235	425	431	422	428	373	374	361	356	366	359
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45	.	.	.	.	.	.	.	.	265	.	238	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCLANLNT	RCLANLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
37	.	37	.	41	.	19	.	.	49	49	.	.	.	.	SIR	93	M2	4	FEMALE	MIDAGE	NNT1 59
38	39	40	40	40	19	19	71	.	52	52	.	.	.	314	SIR	93	XX	4	FEMALE	OLD	NNT1 62
39	.	.	.	.	.	.	72	72	48	47	.	.	.	.	SIR	93	M3	4	FEMALE	YG ADULT	NNT1 63
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	4	MALE	OLD	NNT1 65
41	40	.	41	.	21	.	77	78	54	.	256	252	352	.	SIR	93	M2	4	MALE	YG ADULT	NNT1 67
42	39	.	43	.	21	.	80	.	51	51	.	251	.	368	SIR	93	M3	4	MALE	MIDAGE	NNT1 72
43	39	40	42	43	20	20	.	72	52	53	241	.	356	361	SIR	93	M2	4	MALE	MIDAGE	NNT1 77
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	4	MALE	MIDAGE	NNT1 78
45	42	.	45	44	21	21	.	77	.	.	.	.	.	.	SIR	93	E3	4	MALE	OLD	NNT1 81

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	251	.	245	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
46	.	.	49	50	24	23	.	80	61	60	.	.	.	.	SIR	93	M1	4	MALE	OLD	NNT1 88
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	4	MALE	ADULT	NNT1 88A
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	4	?SEX	ADULT	NNT1 88B
49	.	.	.	.	.	.	.	.	56	54	.	.	.	.	SIR	93	M4	4	MALE	ADULT	NNT1 90
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	4	MALE	ADULT	NNT1 C
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	XX	4	MALE	ADULT	NNT1 C
52	.	38	36	34	19	18	.	.	.	47	.	.	.	.	UNL	94	M6	4	MALE	MIDAGE	NNT2 1
53	.	.	.	.	.	.	.	.	.	55	.	245	.	.	UNL	94	E1	4	FEMALE	MIDAGE	NNT2 4
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M4	4	MALE	MIDAGE	NNT2 7

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
55	133	136	.	310	.	259	.	256	285	.	263	.	444	.	443	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	244	.	222	.	.	.	.	.	.	.	.	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	.	254	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	397	.	388	.	.	.
61	147	142	.	303	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	.	.	240	.	.	.	.	.	.	.	.	444	.	440	360	360	346	350	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
55	.	40	.	44	.	18	.	.	.	.	256	.	.	.	UNL	94	E3	4	MALE	MIDAGE	NNT2	10
56	.	.	.	.	.	.	76	76	4	9	.	.	.	.	UNL	94	M5	4	FEMALE	ADULT	NNT2	17
57	36	35	38	39	17	17	72	.	47	49	.	.	.	.	UNL	94	M5	4	FEMALE	MIDAGE	NNT2	21
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M5	4	FEMALE	MIDAGE	NNT2	22
59	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M5	4	MALE	MIDAGE	NNT2	23
60	.	.	.	.	.	.	77	79	51	50	.	.	.	388	UNL	94	M6	4	MALE	MIDAGE	NNT2	24
61	.	.	.	.	.	.	77	75	52	52	.	.	.	.	UNL	94	M6	4	MALE	MIDAGE	NNT2	26
62	38	37	42	43	19	19	.	.	.	.	.	.	350	346	UNL	94	M6	4	MALE	OLD	NNT2	27
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M5	4	FEMALE	ADULT	NNT2	28

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
64	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	350	.
66	146	146	.	.	.	253	.	250	.	275	.	249	.	.	.	.	.	364	.	355	.	348
67	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	376	.	370	.	.
69	.	.	289	295	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	330
70	151	148	306	307	.	251	.	244	.	268	.	241	.	438	.	432	377	.	363	.	364	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	.	.	.	.	.	.	.	233	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
64	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M5	4	FEMALE	ADULT	NNT2	30
65	.	.	.	.	.	.	76	.	54	.	.	.	.	.	UNL	94	M4	4	FEMALE	ADULT	NNT2	31
66	38	.	42	.	21	.	76	76	48	49	250	.	355	.	UNL	94	M4	4	MALE	YG ADULT	NNT2	32
67	.	37	.	36	.	18	.	.	.	50	.	.	.	.	UNL	94	M4	4	FEMALE	ADULT	NNT2	37
68	.	.	.	.	.	.	.	.	.	.	.	.	370	.	UNL	94	M4	4	MALE	ADULT	NNT2	38
69	35	.	38	.	19	.	.	.	45	46	.	.	.	.	UNL	94	M4	4	FEMALE	OLD	NNT2	39
70	36	38	42	43	21	21	77	76	55	50	244	.	.	363	UNL	94	E1	4	MALE	MIDAGE	NNT2	41
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E2	4	MALE	OLD	NNT2	42
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	FEMALE	MIDAGE	NNT2	43

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	329	319	.	.	310
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	342	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.	398	.	397	.	.	.	.	.	.
77	.	151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	135	134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	141	292	297	244	248	242	243	260	260	242	240	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNT	RCALNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	FEMALE	MIDAGE	NNT2 43A
74	36	36	37	38	17	17	70	69	49	49	.	.	.	319	UNL	94	E1	4	FEMALE	ADULT	NNT2 45
75	37	37	42	41	19	18	.	.	57	54	.	.	.	.	UNL	94	M4	4	MALE	MIDAGE	NNT2 47
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	FEMALE	MIDAGE	NNT2 48
77	.	.	.	.	.	.	.	76	.	52	.	.	.	.	UNL	94	M5	4	MALE	OLD	NNT2 49
78	.	37	.	42	.	21	.	.	47	.	.	.	.	.	UNL	94	E3	4	FEMALE	OLD	NNT2 52
79	.	39	.	42	.	20	.	.	.	.	.	.	.	.	UNL	94	M4	4	MALE	MIDAGE	NNT2 55
80	.	.	.	.	.	.	.	.	.	55	243	242	.	.	UNL	94	M6	4	MALE	YG ADULT	NNT2 56
81	.	.	.	.	.	.	.	.	.	48	.	.	.	.	UNL	94	M6	4	FEMALE	ADULT	NNT2 57

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	140	.	.	236	.	231	.	.	.	.	.	.	409	.	406	355	.	340	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	391	385	386	.	.	.	313	318	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	265	.	241	.	.	.	.	.	.	.	344	.	.	.
87	140	134	.	291	.	.	.	.	246	.	221	.	432	.	430	.	344	.	.	.	.	.
88	.	.	.	.	.	.	.	.	276	.	251	.	455	.	451	.	.	.	.	.	.	366
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE		BURIALID
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	FEMALE	MIDAGE	NNT2	58
83	38	37	40	40	19	19	74	.	50	.	.	231	.	340	UNL	94	M5	4	FEMALE	YG ADULT	NNT2	59
84	38	.	38	.	20	.	.	.	.	50	.	.	318	313	UNL	94	M6	4	FEMALE	YG ADULT	NNT2	60
85	.	.	.	.	.	.	.	.	52	.	.	.	.	.	UNL	94	M6	4	MALE	OLD	NNT2	61
86	46	45	46	47	19	21	78	.	51	51	.	.	.	344	UNL	94	E1	4	MALE	MIDAGE	NNT2	62
87	39	.	41	.	20	.	73	73	53	50	.	.	.	.	UNL	94	M1	4	MALE	MIDAGE	NNT2	64
88	.	43	.	43	.	.	.	83	57	57	.	.	.	.	UNL	94	M6	4	MALE	MIDAGE	NNT2	67
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	FEMALE	MIDAGE	NNT2	68
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	FEMALE	ADULT	NNT2	69

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	271	.	.	.	.	242	.	220	.	.	.	.	.	.	.	.	.	.	.
93	.	.	306	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	151	.	.	307	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	262	.	211	.	206	.	.	.	210	.	.	.	.	.	.	.	.	.	.
98	131	128	268	270	215	.	210	213	.	.	.	.	382	383	380	381	333	334	325	323	.	325
99	125	.	286	.	.	.	.	.	.	.	.	.	396	391	388	385	.	329	.	321	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALLNT	RCALLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M6	4	MALE	OLD	NNT2 70
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M1	4	FEMALE	MIDAGE	NNT2 71A
93	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M1	4	MALE	MIDAGE	NNT2 71B
94	.	37	.	.	.	18	.	.	.	.	.	.	.	.	UNL	94	M1	4	MALE	ADULT	NNT2 73
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M1	4	FEMALE	YG ADULT	NNT2 75
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M1	4	MALE	MIDAGE	NNT2 76
97	31	31	36	37	17	18	71	71	51	50	206	.	.	.	UNL	94	E2	4	FEMALE	MIDAGE	NNT2 78
98	.	.	.	.	.	.	70	71	.	48	213	210	323	325	UNL	94	E3	4	FEMALE	YG ADULT	NNT2 79
99	34	35	38	39	19	20	.	.	50	50	.	.	321	.	UNL	94	E1	4	FEMALE	YG ADULT	NNT2 83

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
100	.	.	.	318	257	259	250	252	277	.	246	249	451	451	448	448	395	392	385	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	422	418	418	416	.	341	.	329	.	.
103	.	135	.	321	.	.	.	253	.	275	.	251	.	.	.	.	.	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	124	.	270	.	229	.	.	.	.	.	210	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
100	42	.	.	.	23	.	81	84	58	57	252	250	.	385	UNL	94	M4	4	MALE	MIDAGE	NNT2	85
101	.	.	.	.	.	.	.	69	.	47	.	.	.	.	UNL	94	M4	4	FEMALE	ADULT	NNT2	86
102	.	.	.	.	.	.	.	70	.	.	.	.	329	.	UNL	94	E2	4	FEMALE	MIDAGE	NNT2	88
103	.	.	.	.	.	.	.	.	.	.	253	.	.	.	UNL	94	E2	4	MALE	OLD	NNT2	89
104	.	.	.	.	.	.	.	.	50	54	.	.	.	.	UNL	94	E3	4	MALE	OLD	NNT2	90
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M5	4	MALE	ADULT	NNT2	95
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M5	4	FEMALE	ADULT	NNT2	98
107	35	34	39	39	21	20	72	74	47	46	.	.	.	.	UNL	94	M1	4	FEMALE	MIDAGE	NNT2	103
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	M1	4	FEMALE	ADULT	NNT2	108

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
109	.	.	.	312	.	.	.	.	.	277	.	251	.	443	.	440	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	.	.	234	.	.	.	252	.	230	.	.	.	.	.	.	.	.	.	.	.
112	127	120	.	.	.	.	.	.	.	.	.	.	.	402	.	400	.	356	.	339	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHHT	RPATHHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
109	.	.	.	.	.	.	80	.	57	56	.	.	.	.	UNL	94	M1	4	MALE	MIDAGE	NNT2 110
110	.	39	.	42	.	20	.	.	.	.	.	.	.	.	UNL	94	M1	4	FEMALE	ADULT	NNT2 111
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E3	4	FEMALE	OLD	NNT2 117
112	35	36	39	.	19	18	.	.	.	.	.	.	339	.	UNL	94	M4	4	FEMALE	MIDAGE	NNT2 124
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UNL	94	E1	4	FEMALE	YG ADULT	NNT2M125
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	10	4	FEMALE	ADULT	BC1 1
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	8	4	FEMALE	YG ADULT	BC1 2
116	.	.	.	.	.	.	.	.	.	51	.	.	.	.	UHM	93	7	4	FEMALE	YG ADULT	BC1 4
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC1 5

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	220	.	.	213	.	.	.	.	.	390	.	.	340	.	.	.	322	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	291	290	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	339	333	329	337	335
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
118	33	.	18	.	37	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC1	6
119	37	36	38	37	21	20	.	75	.	46	213	.	.	.	UHM	93	6	4	FEMALE	YG ADULT	BC1	8
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC1	9
121	.	.	.	.	.	.	.	72	.	50	.	.	.	.	UHM	93	7	4	FEMALE	YG ADULT	BC1	11
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC1	12
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	ADULT	BC1	13
124	.	.	.	.	.	.	74	76	.	50	.	.	329	333	UHM	93	6	4	FEMALE	ADULT	BC1	15
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	FEMALE	YG ADULT	BC1	16
126	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	FEMALE	MIDAGE	BC1	17

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICOLN	RBICOLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	321	326	255	255	245	245	270	271	245	244	464	461	459	453	384	386	373	376	385	380
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	155	.	.	.	.	259	.	252	.	278	251	252	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	136	273	271	.	.	.	.	.	238	.	216	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
127	40	.	44	.	19	.	.	.	.	54	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC1 18
128	.	.	.	.	.	.	.	.	.	44	.	.	.	.	UHM	93	6	4	FEMALE	YG ADULT	BC1 19
129	42	40	49	47	20	20	81	82	52	51	245	245	376	373	UHM	93	6	4	MALE	YG ADULT	BC1 20
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	5	4	FEMALE	ADULT	BC1 21
131	.	.	.	47	.	22	.	.	.	57	252	.	.	.	UHM	93	5	4	MALE	MIDAGE	BC1 23
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	3	4	FEMALE	OLD	BC1 24
133	.	.	.	43	.	18	.	.	.	57	.	.	.	.	UHM	93	4	4	MALE	MIDAGE	BC1 26
134	40	.	43	.	18	.	73	.	50	.	.	.	.	.	UHM	93	6	4	FEMALE	YG ADULT	BC1 27
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	FEMALE	MIDAGE	BC1 28

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	229	.	.	.	.	.	.	.	.	.	.	347	.	.	333	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	228	.	223	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	.	310	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALLNT	RCALLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	5	4	FEMALE	ADULT	BC1 30
137	37	.	40	.	20	.	72	76	49	49	.	.	333	.	UHM	93	4	4	FEMALE	OLD	BC1 31
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	2	4	FEMALE	YG ADULT	BC1 32
139	39	.	42	.	20	.	.	.	.	.	.	.	.	.	UHM	93	2	4	FEMALE	MIDAGE	BC1 33
140	.	.	.	.	.	.	.	.	.	.	.	223	.	.	UHM	93	2	4	FEMALE	MIDAGE	BC1 34
141	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	5	4	MALE	MIDAGE	BC1 35
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	5	4	MALE	YG ADULT	BC1 37
143	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	5	4	MALE	YG ADULT	BC1 39
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	1	4	FEMALE	YG ADULT	BC1 41

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
145	.	146	.	.	255	.	248	.	.	.	.	.	450	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	.	418	.	411	.	.	.	.	.	.
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
149	.	.	.	.	.	.	.	.	.	.	.	.	401	402	394	396	.	344	.	332	.	336
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	137	131	.	.	236	.	231	.	255	.	229	.	.	.	.	.	.	.	.	.	347	.
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALLNT	RCALLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE		BURIALID
145	.	.	44	.	20	.	.	.	60	55	.	248	.	.	UHM	93	2	4	MALE	YG ADULT	BC1	43
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	1	4	MALE	MIDAGE	BC1	44
147	.	.	38	.	.	15	.	67	.	53	.	.	.	.	UHM	93	2	4	FEMALE	YG ADULT	BC1	45
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	2	4	MALE	YG ADULT	BC1	47
149	38	37	34	35	18	18	67	68	44	46	.	.	332	.	UHM	93	2	4	FEMALE	MIDAGE	BC1	48
150	.	.	.	.	.	.	81	78	.	53	.	.	.	.	UHM	93	5	4	MALE	ADULT	BC1	50
151	38	.	39	42	17	16	.	.	.	.	.	.	.	.	UHM	93	10	4	FEMALE	YG ADULT	BC2	1
152	35	.	41	.	19	.	.	.	.	.	.	231	.	.	UHM	93	10	4	MALE	YG ADULT	BC2	2
153	.	39	.	.	.	16	.	.	.	.	.	.	.	.	UHM	93	10	4	FEMALE	MIDAGE	BC2	3

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
154	.	.	.	309	.	256	.	.	.	279	.	252	.	.	.	.	.	.	.	.	.	.
155	.	.	312	.	248	.	243	.	271	.	242	.	.	.	.	.	.	.	.	.	.	.
156	.	.	.	.	220	.	215	.	242	.	217	.	.	.	.	.	.	.	.	.	.	.
157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	358	.	342	.	.
158	133	131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	128	127	.	282	222	222	217	218	242	244	222	223	.	414	.	411	342	343	333	333	333	.
160	135	.	.	.	240	.	236	.	256	.	236	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	265	.	263	284	.	257	.	.	.	.	.	395	.	.	.	381	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALLNT	RCALLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
154	.	.	.	.	.	.	.	82	.	57	.	.	.	.	UHM	93	9	4	MALE	MIDAGE	BC2	6
155	34	34	17	18	.	.	.	.	.	.	.	243	.	.	UHM	93	10	4	MALE	OLD	BC2	7
156	.	.	.	.	.	.	.	.	.	.	.	215	.	.	UHM	93	9	4	FEMALE	YG ADULT	BC2	9
157	38	35	39	40	20	20	75	.	.	.	.	.	342	.	UHM	93	7	4	FEMALE	ADULT	BC2	15
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	7	4	FEMALE	MIDAGE	BC2	15A
159	.	36	.	35	.	17	70	70	47	47	218	217	333	333	UHM	93	7	4	FEMALE	YG ADULT	BC2	19
160	.	.	.	.	.	.	77	76	53	51	.	236	.	.	UHM	93	7	4	FEMALE	YG ADULT	BC2	20
161	.	.	.	.	.	.	.	91	58	60	263	.	.	.	UHM	93	7	4	MALE	MIDAGE	BC2	22
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	7	4	FEMALE	ADULT	BC2	23

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
163	157	151	321	.	.	.	.	.	.	.	.	.	.	.	.	.	.	388	.	378	.	.
164	.	.	.	.	.	.	.	.	.	257	.	236	.	.	.	.	.	.	.	.	.	.
165	.	.	.	304	248	.	241	.	272	.	242	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	276	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	123	117	.	285	.	.	.	.	244	.	221	.	412	406	399	397	.	345	329	334	333	.
168	.	.	.	.	.	.	.	.	.	239	.	216	.	401	.	398	.	335	.	324	.	.
169	142	145	301	300	248	245	242	241	267	266	240	236	432	432	428	426	.	.	.	.	.	.
170	140	143	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	154	152	304	303	236	239	.	360	258	.	230	.	.	.	.	.	368	.	230	234	360	.

OBS	LPATTHT	RPATTHT	LPATTWD	RPATTWD	LPATTHK	RPATTHK	LCALLNT	RCALLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
163	44	44	42	42	20	19	.	.	.	.	.	.	378	.	UHM	93	7	4	MALE	YG ADULT	BC2 24
164	.	42	.	43	.	20	.	83	63	59	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC2 25
165	.	.	.	.	.	.	.	.	.	.	.	241	.	.	UHM	93	5	4	FEMALE	YG ADULT	BC2 27
166	36	36	40	40	20	20	.	.	.	.	.	.	.	.	UHM	93	6	4	FEMALE	YG ADULT	BC2 28
167	34	34	38	37	18	17	71	71	51	.	.	.	334	329	UHM	93	5	4	FEMALE	YG ADULT	BC2 29
168	.	.	.	.	.	.	.	71	.	49	.	.	324	.	UHM	93	5	4	FEMALE	YG ADULT	BC2 30
169	38	.	38	.	17	.	.	77	.	.	241	242	.	.	UHM	93	4	4	MALE	MIDAGE	BC2 31
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC2 32
171	39	39	39	41	21	20	.	76	.	51	360	.	234	230	UHM	93	5	4	FEMALE	YG ADULT	BC2 33

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
172	135	.	.	291	.	.	.	.	.	.	.	226	425	.	420	.	352	355	339	342	343	345
173	.	.	319	321	250	.	.	.	.	276	.	248	.	.	.	.	.	.	.	.	.	.
174	.	.	.	.	.	.	.	.	.	266	.	245	.	.	.	.	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	441	.	433	.	376	377	361	365	.	364
176	.	.	.	.	260	261	253	255	.	.	251	252	.	.	.	.	398	398	386	385	.	380
177	.	.	.	.	.	.	.	.	.	.	.	.	.	397	.	396	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
179	146	.	.	302	.	242	.	236	.	262	.	232	.	.	.	.	.	373	.	359	.	.
180	129	131	.	288	228	223	225	217	.	241	228	223	.	.	.	.	336	.	336	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNT	RCALNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
172	.	.	.	.	.	.	73	73	52	.	.	.	342	339	UHM	93	4	4	FEMALE	YG ADULT	BC2	34
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	4	4	MALE	MIDAGE	BC2	35
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	6	4	MALE	MIDAGE	BC2	36
175	44	44	47	46	22	21	88	87	58	57	.	.	365	361	UHM	93	10	4	MALE	YG ADULT	BC2	39
176	42	41	44	45	21	22	77	78	54	52	255	253	385	386	UHM	93	7	4	MALE	MIDAGE	BC2	40
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	7	4	FEMALE	YG ADULT	BC2	41
178	38	40	44	43	20	22	.	.	.	.	.	.	.	.	UHM	93	5	4	MALE	MIDAGE	BC2	42
179	39	39	44	45	21	21	78	78	54	55	236	.	359	.	UHM	93	4	4	MALE	MIDAGE	BC2	45
180	.	.	.	.	.	.	.	.	45	.	217	225	.	336	UHM	93	4	4	FEMALE	MIDAGE	BC2	46

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
181	152	146	303	302	251	252	241	245	.	.	.	247	448	442	443	441	.	382	364	.	.	364
182	.	.	302	.	.	.	.	.	.	.	.	.	445	.	441	.	.	374	341	358	.	345
183	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
184	150	151	.	315	263	266	254	260	281	283	254	259	458	454	457	451	389	388	378	376	388	387
185	141	142	310	310	259	.	.	253	280	.	254	249	.	.	.	.	.	381	.	370	.	368
186	.	.	.	299	.	254	.	247	.	273	.	244	.	.	.	.	.	.	.	.	.	.
187	.	.	.	.	.	.	340	343	.	.	230	.	430	430	424	424	356	354	.	.	.	332
188	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
189	130	.	278	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	329	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
181	44	44	46	46	22	22	.	81	56	56	245	241	.	364	UHM	93	3	4	MALE	MIDAGE	BC2 47
182	.	.	.	.	.	.	84	84	.	56	.	.	358	341	UHM	93	3	4	MALE	YG ADULT	BC2 49
183	.	.	.	.	.	.	.	.	.	55	.	.	.	.	UHM	93	3	4	MALE	MIDAGE	BC2 49A
184	43	.	49	.	22	.	82	82	60	60	260	254	376	378	UHM	93	4	4	MALE	YG ADULT	BC2 50
185	.	.	.	.	.	.	88	.	56	55	253	.	370	.	UHM	93	4	4	MALE	MIDAGE	BC2 51
186	.	.	.	.	.	.	.	.	.	.	247	.	.	.	UHM	93	5	4	MALE	ADULT	BC2 53
187	43	45	47	50	22	23	.	82	.	54	343	340	.	.	UHM	93	5	4	MALE	MIDAGE	BC2 56
188	.	.	.	.	.	.	.	.	.	51	.	.	.	.	UHM	93	2	4	FEMALE	MIDAGE	BC2 57
189	.	36	41	41	20	20	.	78	52	52	.	.	.	.	UHM	93	5	4	FEMALE	MIDAGE	BC2 59

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
190	.	.	.	.	.	230	225	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
191	140	.	293	.	.	240	336	340	.	259	231	231	425	426	.	426	.	354	.	.	334	330
192	.	121	.	.	.	.	.	.	.	.	.	.	405	.	397	.	.	343	.	337	327	.
193	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	368	.	355	.	.	.
194	.	143	303	310	253	251	243	245	.	.	247	.	447	448	442	441	372	370	361	359	360	363
195	153	164	.	330	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
196	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
197	.	.	.	294	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
198	150	.	296	.	242	245	238	240	.	263	234	238	436	436	431	433	.	361	351	351	351	349

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALNLNT	RCALNLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID	
190	.	.	.	.	.	.	.	.	.	.	.	225	.	.	UHM	93	4	4	FEMALE	MIDAGE	BC2	61
191	.	.	43	.	20	.	.	.	.	53	340	336	.	.	UHM	93	4	4	MALE	MIDAGE	BC2	65
192	.	.	.	.	.	.	.	.	.	.	.	.	337	.	UHM	93	4	4	FEMALE	YG ADULT	BC2	69
193	.	.	.	.	.	.	72	71	46	.	.	.	.	355	UHM	93	7	4	MALE	YG ADULT	BC2	71
194	.	42	.	46	.	24	85	85	60	61	245	243	359	361	UHM	93	3	4	MALE	YG ADULT	BC2	72
195	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	7	4	MALE	YG ADULT	BC2	73
196	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	2	4	MALE	MIDAGE	BC2	74
197	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	7	4	FEMALE	YG ADULT	BC2	75
198	39	40	41	42	19	20	79	76	51	49	240	238	351	351	UHM	93	3	4	MALE	YG ADULT	BC2	76

INFRACRANIAL METRIC DATA FOR ADULTS FROM NORTHEAST THAILAND

OBS	LCLAVLNT	RCLAVLNT	LHUMLNTH	RHUMLNTH	LRADLNTH	RRADLNTH	LRADPHYS	RRADPHYS	LULNALNT	RULNALNT	LPHYLNTH	RPHYLNTH	LFEMLNTH	RFEMLNTH	LBICONLN	RBICONLN	LTIBLNTH	RTIBLNTH	LTIBPHYS	RTIBPHYS	LFIBLNTH	RFIBLNTH
199	.	.	.	.	.	237	.	231	.	.	.	.	.	.	.	.	.	.	.	.	.	.
200	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	352	.	.	.	.
201	.	.	.	.	.	.	.	.	.	.	.	.	495	.	.	.	.	.	.	.	.	.
202	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LPATHT	RPATHT	LPATWD	RPATWD	LPATHK	RPATHK	LCALLNT	RCALLNT	LTALUSL	RTALUSL	RRADPHYS	LRADPHYS	RTIBPHYS	LTIBPHYS	INSTCODE	YEAREXAM	PERIOD	CARDNO	SEX	AGE	BURIALID
199	.	.	.	.	.	.	.	.	.	.	231	.	.	.	UHM	93	7	4	MALE	MIDAGE	BC2 78
200	.	.	.	.	.	.	.	.	53	.	.	.	.	.	UHM	93	3	4	FEMALE	MIDAGE	BC2 79
201	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	3	4	MALE	ADULT	BC2 79A
202	.	.	.	.	.	.	.	.	.	.	.	.	.	.	UHM	93	3	4	FEMALE	ADULT	BC2 81

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	0	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	0	0	0	0	0
6	.	.	.	.	.	.	.	0	.	1	.	1	.	.
7	.	.	.	0	0	.	.	.	1	0	1	0	1	0
8	.	.	.	.	.	1	.	1	1	.	.	.	0	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	0	0	.	.	0	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	0	.	0	.	.	.
5	.	.	0	.	.	.	.	.	1	.	.	1	0	0
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	1	.	0	.	.	.	0	.	.	.	1	.	.	.
8	.	.	.	.	.	.	1	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS	LTRIQCAR	LTRIQPIS	RTRAPCAR
1	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	0	0	.	.	.	.	.	.	.	.	.
6	.	.	.	.	0	0	.	.	.	.	.	.	.
7	.	.	0	1	0	1	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
7	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RMC1PDRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS
1	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	0	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.
5	.	0	0	0	0	0	0	.	0	0	0	.
6	.	.	.	0	.	.	0	0	.	.	0	0
7	0	0	1	1	1	.	0	0	1	0	0	0
8	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	0	0	.	.	.	0	.	.	.	.	.	0	0
6	.	.	.	.	.	.	.	0	.	.	.	0	.	.
7	0	.	0	.	.	.	.	.	0	0	0	0	0	0
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	0	.	.	.	0	.	.	0	.	.	.	.	.	.	.	.	1	.
2	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	0	.	.	0	0	0	.	.	.	.	.	.	.	0	1	1	0	0	.	0
3	.	.	.	.	.	.	.	0	.	.	.	.	.	.	7	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	0	0	0	2	.	.	0	0	0	0	.	.	0	.	0	0	0	0	0	.	0	0	.	0	.	0	.	.	0	0	.	.	.	1	.	.	1	.
6	0	0	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	0	0	0	.	0	0	0	.	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	0	.	.	1	1	.	.	.	1	1
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	1	0	1	4	1	1	1	1	1	1	1	1	.	.	0	.	0	.	0	.	0	.	0	.	0	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	0	0	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	0	1	0	1	0	.	.	0	0	0	0	0	0	.	.	.	.	.	.	0	1	0	0	0	0	0	0	1	.	1	0	0	.	0	0	1	.	0	0	0	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
1	.	.	.	.	.	.	.	.	.	.	.	.		.		9	7	2	1	BC	2
2	.	.	0	.	0	.	.	.	.	.	.	.		.	A	6	7	2	1	BC	4
3	.	.	.	.	.	.	.	.	.	.	.	.		.		6	7	1	2	BC	6
4	.	.	.	.	.	.	.	.	.	.	.	.		.		6	7	1	2	BC	7
5	.	.	.	.	.	.	.	.	.	.	.	.		.	E	6	7	2	2	BC	8
6	.	.	.	.	.	.	.	.	.	.	.	.		.		6	7	1	2	BC	9
7	0	0	.	.	.	.	.	.	.	.	.	.		.	A	7	7	2	1	BC	11
8	.	.	.	.	.	.	.	.	.	.	.	.		.		5	7	1	2	BC	12
9	.	.	.	.	.	.	.	.	.	.	.	.		.		5	7	1	7	BC	13

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS	LTRIQCAR	LTRIQPIS	RTRAPCAR
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	0	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	0	.	0	1	.	1	.	.	.	.	.	.	.	1	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	4	.	.	1	0	1	0	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	.	1	1	.	.	0	0	1	0	0	0	.	.	0	1	1	0	1
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	1	.	1	1	1	8	.	.	8	.	1	.	1	.	1	1	0	.	0	1	1	1	1	0	0	.	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	0	0	0	.	0	.	0	.	.	.	0	.	0	.	0	0	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.

OBS	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
14	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	1	1	.	.	0	1	1	0	1	1	1	0	1	0	.	.	0	0	0	0	1	0	0	0
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	.	.	1	0	.	0	1	0	1	0	1	.	1	0	.	.	1	.	1	0	0	0	.	.
17	.	.	.	.	.	.	.	.	.	1	.	.	.	0	0	1	1	.	.	0	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LLA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	1	1	0	0	0	1	0	1	1	1	.	.	.	1	1
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	.	.	1	.	.	.	.	.	.	0	1	1	1	1	1	1	1
13	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	0	0	.	0	0	.	.	.	.	.	0	0	0	.	.	.	0	0
14	.	.	0	0	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	0	2	0	0	2	1	0	1	1	1	1	0	1
15	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	0	0	0	.	1	.	1	.	1	1	1	.	.	.	1	.	.	.	8	1	.	.	0	.	1	.	1	1	.	.	.	.	.	.	1	1	1	1	1	1	1
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	0	.	.	.	.	.	1	1	1	1	.	.	.	.
18	.	.	.	.	0	0	0	0	0	0	1	0	.	.	.	.	.	.	.	.	0	0	.	.	0	.	0	0	.	.	.	.	.	.	.	.	0	0	0	.	.

OBS	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBALC	RCUBMT	LCUBALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS
10	1	1	1	1	1	.	.	.	.	.	.	1	1	1	1	.	.	1	1	.	.	1	1	1	1	.	.	1	1	.	.	.	.	1	1	.	.	1	1	1	1
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	0	.	.	1	0	1	1	.	.	.	.	0	0	.	1	0	0	.	.	0	0	.	.	0	0	0	0	1	0	0	.	0	.	.	.	.	.	.	.	1	.
13	0	0	0	.	.	0	0	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0	0	0	.	.	.	0	.	.	.	0	.	.	.	0	0
14	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	0	.	.	1	1	1	1	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	1	0	.	.	0	0	.	.	1	0
17	.	.	0	0	1	0	1	.	0	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	1	0	.	.
18	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
10	1	1	.	.	.	.	.	.	.	.	.	.		.		6	7	2	7	BC	15
11	.	.	.	.	.	.	.	.	.	.	.	.		.	C	5	7	2	1	BC	16
12	0	.	0	0	0	0	.	.	.	.	.	.		.		6	7	1	2	BC	18
13	.	.	.	.	.	.	.	.	.	.	.	.		.		6	7	2	1	BC	19
14	1	1	1	1	1	0	1	1	.	.	.	.		.	E	6	7	1	2	BC	20
15	.	.	.	.	.	.	.	.	.	.	.	.		.		5	7	2	7	BC	21
16	.	.	0	0	.	.	.	.	.	.	.	.		.	G	5	7	1	2	BC	23
17	.	.	.	.	0	0	.	.	.	.	.	.		.		4	7	1	2	BC	26
18	.	.	.	.	.	.	.	.	.	.	.	.		.	C	6	7	2	1	BC	27

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS	LTRIQCAR	LTRIQPIS	RTRAPCAR
19	4	4	.	.	1	1	1	0	1	1	1	1	1	1	.	.	0	.	.	.	1	1	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	2	.	.	1	.	.	7	.	.	.	.	2	1	1	1	0	1	1	1	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	2	.	.	1	2	.	.	7	.	1	.	1	.	7	.	7	1	.	0	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	0	2	.	.	1	2	.	.	1	.	1	.	1	.	0	.	.	.	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
26	0	4	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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21	.	1	1	1	1	.	.	.	.	1	1	1	1	1	1	0	0	.	.	0	0	.	.	1	0	.	.	1	0	.	.	1	0	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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24	1	.	.	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	8	1	.	.	.	1	.	.	1	0	.	.	.	0	.	.	1	2	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL
19	.	.	0	.	2	.	.	.	1	.	0	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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21	.	.	.	.	1	.	1	.	.	.	1	.	1	1	1	1	.	.	.	.	1	2	.	0	.	.	1	1	0	.	.	.	.	.	1	1	4	1	1	1	1
22	.	.	.	.	.	.	.	.	.	.	.	0	.	.	1	1	.	.	.	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	.	1	.	0	0	.	.	.	.	.	.	0	0	.	.	0	0	0	0	.	.	0	0	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
21	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	4	1	1	1	0	1	0	2	0	0	0
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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27	.	.	.	1	0	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	0	.	.	.	1	.	.	.	.	.	.	1	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
19	.	.	.	.	.	.	.	.	.	.	.	.		.	G	5	7	2	2	BC	28
20	.	.	.	.	.	.	.	.	.	.	.	.		.		5	7	2	7	BC	30
21	0	1	0	0	0	0	0	0	.	.	0	.		.	I	4	7	2	3	BC	31
22	.	.	.	.	.	.	.	.	.	.	.	.		.	E	2	7	2	2	BC	32
23	.	.	.	.	.	.	.	.	.	.	.	.		.	G	2	7	2	2	BC	33
24	.	.	.	.	.	.	.	.	.	.	.	.		.	F	2	7	2	2	BC	34
25	.	.	.	.	.	.	.	.	.	.	.	.		.	G	5	7	1	2	BC	35
26	.	.	.	.	.	.	.	.	.	.	.	.		.	E	5	7	1	2	BC	39
27	1	.	.	.	1	1	.	.	.	.	.	.		.	F	1	7	1	2	BC	44

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPAS	LTRIQCAR	LTRIQPAS	RTRAPCAR
28	4	5	.	.	.	.	.	.	.	.	.	0	.	0	0	.	0	1	.	.	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	0	.	.	.	.	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.
30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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32	.	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	4	5	0	5	0	0	0	0	.	1	0	0	0	0	0	.	1	1	.	0	1	.	1	0	1	1	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	0	.	.	.	.	0	.	.	1	.	1	1	0	0	1	1	0	.	1	.	1	.	1	.	1	1	.	.	.	.	1	1	1	1	.	.	.	.	1	1	.
36	.	5	.	.	5	1	1	.	1	1	.	1	.	1	1	.	1	1	.	1	.	1	2	1	.	1	0	1	1	1	0	1	.	.	.	1	.	.	1	1	1

OBS	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D
28	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	.	.	.	0	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	0	0	0	0	.	.
29	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0	0	0	0
30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	0	.	.	0	0	.	.	.	.	.	.	.	0	.	.	.	.	1	0	0	0	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	0	.	0	.	0	1	0	.	.	.	.	1	0	.	.	0	0	0	0	0	0
36	1	.	.	1	1	.	.	1	1	1	1	1	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL
28	0	0	.	.	.	.	.	.	.	.	0	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0	0	0	0	1
29	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	.	.	.	.	.	1	1	.	.	1	.	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	.	0	.	0	0	.	1	1	1	1	1	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	0	.	0	1	1	.	.	.	1	1
32	.	.	.	.	0	0	0	0	.	.	.	.	0	0	0	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.
33	0	0	.	0	.	.	.	.	4	4	.	0	1	.	0	0	1	.	.	.	0	1	.	.	0	.	.	.	.	.	.	.	0	.	.	.	1	.	.	.	.
34	.	0	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	0	0	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	0	1	1	.	.	.	1	1
36	1	1	2	2	.	.	.	.	.	.	.	.	1	2	2	1	1	.	.	7	.	1	1	1	.	.	.	.	.	.	1	.	1	.	.	.	1	1	1	.	1

OBS	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS
28	.	.	.	0	0	0	0	.	.	.	.	0	0	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	.	0	.	0	.	.	.	0	.
29	.	0	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	0	1	0	.	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	.	0	0	.	0	.	0	0	0	0	0	0
31	0	1	0	.	.	.	.	0	1	1	1	.	.	0	0	.	.	0	0	.	.	0	0	0	1	.	.	.	.	.	.	.	.	.	.	0	0	1	.	0	0
32	.	.	.	0	0	0	.	0	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
35	1	.	.	1	1	.	.	.	.	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.
36	.	1	1	1	1	1	1	.	.	1	1	1	1	1	1	1	1	1	1	.	.	1	1	1	0	.	.	.	1	1	.	.	1	1	.	1	1	1	.	1	1

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
28	0	.	0	.	.	.	.	.	0	0	.	0		.	E	2	7	1	2	BC	43
29	.	.	.	0	0	0	.	.	.	.	.	.		.	C	2	7	1	1	BC	47
30	0	0	1	0	1	0	.	.	.	.	.	.		.	F	2	7	2	2	BC	48
31	1	.	1	0	1	0	.	.	.	.	.	.		.		5	7	1	7	BC	50
32	.	.	.	.	.	.	.	.	.	1	.	.		.	B	10	7	2	1	BC	1
33	0	.	.	.	.	.	.	.	.	.	.	.		.	E	10	7	1	2	BC	2
34	.	.	.	.	.	.	.	.	.	.	.	.		.		10	7	2	2	BC	3
35	0	0	.	.	.	.	.	.	.	.	.	.		.	F	9	7	1	2	BC	6
36	9	.	1	1	.	.	.	.	.	.	.	.		.	H	10	7	1	3	BC	7

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPPISI	LPPISI	RTRIQCAR
37	.	.	1	.	0	.	.	.	.	.	0	.	0	.	0	1	0	1	1	0	1	.	1	0	1	1	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	4	1	4	.	0	0	.	.	0	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40	0	0	0	0	0	0	0	0	1	.	0	0	0	0	0	0	.	.	0	0	0	0	0	1	0	0	.	.	.	.	0	0	0	0	.	.	0
41	.	.	0	2	.	.	0	1	.	.	.	1	.	1	.	.	1	1	.	0	.	.	1	0	.	0	.	.	0	1	.	.	0	1	1	0	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	2	.	2	.	2	7	1	7	.	.	.	.	.	.	.	.	.	.	.
43	1	0	1	0	.	0	.	.	0	0	.	.	.	.	0	.	.	.	.	.	0	.	.	0	.	.	.	.	0	0	.	.	0	0	.	.	.
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.
45	.	.	0	.	.	.	0	0	0	0	0	0	0	.	.	0	0	.	0	.	.	0	0	.	0	.	.	0	0	.	.	0	0	.	0	.	.

OBS	RTRIQPIS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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40	0	.	.	0	0	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	0	0	1	0	.	.	1	0	.	.	1	0	.	.	1	0	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	6	.	.	.	.	.	.	.	.	.	.	1	1
43	.	0	0	1	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	0	0
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMC5PRX	LMC5DIS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB
37	.	.	1	1	.	.	1	.	.	.	.	.	.	1	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	0	.	1	.	0
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40	0	0	0	0	0	0	0	0	0	0	0	0	1	.	1	1	.	.	0	1	.	0	.	0	0	0	1	0	.	.	0	0	0	0	0	0	0
41	1	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	1	.
42	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	1	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	0	.	.	.	0	.	.	0	0	.	.	0	1	0	1	0	1	.	.	1	1	.
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	1	1	1
45	0	0	.	.	0	0	.	.	0	0	.	0	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTIBFIB	RFIBTIB	RFIBTAL	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	0	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	1	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40	0	0	0	0	0	1	0	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
41	.	.	0	.	.	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	0	.	.	1	1	.	.	1	1	1	1	1	1
42	1	.	2	1	2	1	1	1	1	1	1	2	1	.	.	.	.	2	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	1
43	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	1	.	1	.	1	1	2	1	2	2	1	1	1	.	.	1	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	E	9	7	2	2	BC	9
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	1		.		7	7	2	7	BC	15
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	F		7	2	2	BC	15A
40	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	.		.	D	7	7	2	1	BC	19
41	.	.	1	0	.	.	1	0	.	.	1	0	.	.	1	0	.	.	0	0	.	.	0	0	.	.	.	.		.	E	7	7	2	2	BC	20
42	.	.	1	1	.	.	1	1	1	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	.		.		7	7	1	2	BC	22
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	D	7	7	1	1	BC	24
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.		6	7	1	2	BC	25
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	E	5	7	2	2	BC	27

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
46	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	1	0	0	.	.	0	0	.	.	.	.	.	.
47	0	0	0	0	0	0	.	0	0	.	0	.	0	.	.	.	.	.	.	.	.	.	0	0	.	0	0	0	0	0	0	0	0	0	.	0	0	0
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	0	.	.	0	.	0	0	.	.	.	.	.	.	0	.	0	0
49	0	4	0	4	0	1	0	1	1	1	0	0	1	1	4	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	1	1	.	.	.	.
50	1	4	4	.	.	.	1	1	.	1	.	.	.	.	.	.	.	1	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	1	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	1	1	1	.	.	.	.	.	.	.	.	.	.	0	0
52	4	.	4	0	0	0	0	0	0	.	0	1	0	0	0	.	0	.	.	.	1	0	1	.	1	1	0	0	0	0	0	0	0	0	0	.	0	0
53	4	1	4	5	0	0	.	0	0	1	1	0	0	0	1	1	1	1	0	0	1	0	1	.	1	1	1	1	1	4	.	.	0	1	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	1	1	1	7	1	7	7	0	1	0	1	0	1	0	1	.	1	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
46	.	.	.	.	1	.	1	1	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	.	1	.	1	.	.	.	.	.	.	.	.	.
47	0	0	.	.	0	0	0	0	.	.	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	1	0
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
51	0	0	1	1	.	.	0	0	.	.	0	1	.	.	.	.	.	.	0	0	0	.	0	0	.	.	0	0	0	0	.	0	1	0	1	.	0	0
52	.	.	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	.	.	0	0	1	0	1	0	1	0	1	0	.	0	0	0	0	.	0	0
53	.	.	.	.	1	1	.	.	1	1	.	.	1	1	0	1	1	1	1	0	.	.	.	.	1	.	.	.	1	0	1	0	1	0	1	0	1	0
54	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	.	1	.	1	.	.	.	1	0	.	.	1	.	1	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
46	0	0	0	0	.	.	.	.	.	0	.	1	0	.	.	.	.	.	1	1	1	1	1	1	0	0	0	1	.	.	.	0	.	.	.	.	.	.
47	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0
48	0	0	.	.	.	.	.	.	.	0	0	.	.	.	0	.	0	0	.	.	0	.	0	0	.	.	0	0	.	.	0	.	0	.	0	0	.	.
49	0	0	0	0	.	.	.	.	.	0	1	1	7	1	1	.	1	1	0	0	1	1	1	1	.	.	4	1	.	.	1	1	.	1	.	.	.	.
50	0	0	0	0	.	.	0	0	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	0	0	0	0	0	0	0	0	0	.	1	1	.	0	1	1	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	1	.	.	.	.
52	0	0	0	0	0	0	0	0	.	.	1	1	0	0	.	.	0	0	0	.	0	0	0	0	.	.	.	.	0	0	0	0	1	1	0	0	0	0
53	0	0	0	0	0	0	0	0	0	.	1	2	1	1	7	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	1	1	1	1	1	1	1	1	.	.	1	1	1	1	.	.	1	1	0	0	0	0	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	0	0	.	.	0	0	0	.	0	0	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.
48	0	0	.	.	0	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	4	.	.	.	.
49	.	1	1	1	0	1	1	.	1	.	1	0	1	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	1	0	1	1	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	0	0	0	0	1	1	1	0	0	.	0	0	1	0	.	.	.	.	0	0	0	0	0	0	.	.	1	1	0	0	.	.	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	E	6	7	2	2	bc	28
47	.	.	.	.	0	0	0	.	0	0	0	.	.	.	0	0	0	0	0	0	0	0	.	.		.	A	5	7	2	1	BC	29
48	.	.	0	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.		.	B	5	7	2	1	BC	30
49	.	.	.	.	.	.	.	.	1	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.		.	G	4	7	1	2	BC	31
50	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	0	.	.	.	.	.	.		.		6	7	1	2	BC	32
51	0	0	0	.	0	0	.	.	0	0	.	.	0	0	0	0	0	0	0	0	0	0	.	0		.	C	5	7	2	1	BC	33
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0		.	C	4	7	2	1	BC	34
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	G	4	7	1	2	BC	35
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	G	5	7	1	2	BC	36

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
55	.	.	.	.	.	0	.	1	.	1	1	1	.	1	1	1	0	1	0	1	2	.	2	.	1	1	.	.	0	0	.	.	0	0	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	0	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	2	.	.	1	.	.	.	.	.	.	.	.	.	.	0	.	.	.
58	4	.	5	5	.	2	1	1	1	.	0	.	1	.	0	1	.	.	1	.	1	1	.	.	1	.	0	1	0	1	1	1	0	1	.	.	1	1
59	4	0	4	4	0	0	0	0	0	1	1	.	0	0	0	0	0	0	0	0	1	0	1	0	1	1	.	.	.	.	.	.	0	0	.	.	.	.
60	0	4	0	4	0	1	0	1	1	1	1	1	0	0	0	1	0	1	1	1	1	0	1	.	1	1	0	1	1	1	0	1	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	0	.	0	.	0	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	.	.	.	.	.	2	.	.	.	.	.	.	0	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
63	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	1	0	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
55	.	.	1	0	0	1	0	0	0	0	.	.	1	1	1	0	0	1	0	.	1	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	.
56	.	.	1	1	.	.	1	1	.	.	.	.	.	.	1	1	.	.	0	1	.	.	1	0	.	.	0	0	.	.	1	0	.	.	1	0	.	.
57	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	0	.	.	1	0	1	0
58	.	.	1	1	1	1	1	1	1	1	1	1	.	.	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	0	1	0	1	.	1	0	.	.
59	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	.	.
60	.	.	.	.	.	.	1	1	.	.	1	1	1	1	.	.	.	.	1	1	1	0	1	0	4	0	1	0	1	0	1	0	1	0	1	0	1	0
61	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	0	1	0	.	.	1	0	.	.	.	.	1	.	.	.
62	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	0	.	.	1	0	.	.	1	0	.	.
63	.	.	0	0	.	.	.	.	.	.	.	.	1	1	.	.	.	.	0	0	0	0	0	0	1	0	.	.	.	.	0	0	.	.	0	0	0	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RLA	LLA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
55	0	0	1	0	0	0	0	0	.	0	1	1	3	1	1	1	3	0	1	.	1	.	.	0	1	7	0	1	0	2	0	0	1	1	1	0	1	1
56	1	0	.	.	0	0	0	0	.	.	.	.	.	.	.	.	1	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	1	1	1	1	1	1	1	1	1	.	.	1	.	.	.	.	.	.	0	0	0	.	1	.	1	1	1	1	.	.	1	1	.	1	.	0	.	.
58	1	0	1	0	1	1	1	0	1	.	2	2	2	8	1	1	1	1	2	1	1	1	1	1	7	1	7	1	0	2	0	1	1	1	0	0	0	.
59	0	0	1	0	.	.	.	.	.	.	1	7	1	1	1	.	1	1	1	1	1	.	0	0	.	.	.	.	0	0	0	0	.	1	.	0	.	0
60	0	0	0	0	1	0	1	0	1	.	1	1	1	1	1	1	0	1	0	0	1	1	0	1	0	1	1	1	0	0	1	0	1	1	0	0	0	0
61	.	.	0	0	.	.	0	0	.	.	1	1	.	1	.	.	.	0	1	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	.	0
62	1	0	.	.	0	0	.	.	0	.	.	1	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
63	0	0	0	0	0	0	0	0	.	.	1	1	1	1	1	1	0	1	0	0	0	0	0	0	.	.	0	0	0	0	0	0	1	1	0	0	1	1

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
55	.	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1	0	.	.	1	1	.	.	1	1	1	1	1	0	1	0	1	0
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
58	.	.	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	.	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1
59	.	0	.	.	0	1	1	.	1	0	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.
60	.	0	1	1	1	1	1	1	1	1	1	1	.	.	1	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
61	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	1	1	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	1	1	1	0
63	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0	0	1	0	1	0	0	0	0	1	1	0	1	0	2	.	.	0	2	0	2	0	0

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODED	PERIOD	CARD7	SEX	AGE	SITE	BURID
55	.	.	1	0	1	.	1	0	1	0	1	0	2	0	0	0	1	0	1	0	0	0	1	0		.	G	7	7	1	2	BC	40
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.		7	7	2	1	BC	41
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	F	5	7	1	2	BC	42
58	1	0	1	1	.	.	1	0	1	.	1	1	1	1	1	0	1	0	0	0	0	0	0	.		.	G	4	7	1	2	BC	45
59	1	2	1	.	1	0	1	0	1	0	1	0	1	0	.	.	2	0	.	.	.	.	.	.		.	G	4	7	2	2	BC	46
60	1	0	1	.	.	0	1	0	1	0	0	.	1	0	1	0	2	1	.	.	.	.	1	.		.	G	3	7	1	2	BC	47
61	1	8	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	E	3	7	1	2	BC	49
62	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.		.	G	3	7	1	2	BC	49A
63	0	0	1	0	5	0	0	0	0	0	.	0	0	0	0	0	0	0	0	.	.	.	.	.		.	C	4	7	1	1	BC	50

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
64	0	0	0	.	4	1	4	1	1	1	1	1	0	0	0	0	0	1	0	0	1	0	1	0	1	1	0	1	0	1	1	1	1	1	.	.	1	1
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	1	.	.	.	2	.	.	0	1	.	1	1	1	.	.	.	.	1	0
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
67	4	.	0	.	.	1	0	1	.	0	1	1	0	0	0	1	1	.	1	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.
68	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	7	4	.	.	.	1	.	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	.	.	1	.	.	.
70	0	0	0	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	0	.	.	.	0	.	.	0	0	0	.	.	0	0	.	.	.	.	0	0
71	0	0	0	.	0	0	.	0	1	0	0	1	0	0	1	1	1	1	0	0	1	1	1	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.
72	4	4	4	4	0	1	1	2	1	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
64	1	1	1	1	1	1	.	.	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	.	1	0	1	0	1	0	1	0	1	0	.	.	1	.
65	.	.	1	1	.	.	1	1	.	.	1	1	.	1	0	1	.	1	.	0	.	.	1	0	1	.	1	1	1	0	0	0	0	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	1	.	.	1	1	1	1	.	.	1	1	1	1	1	1	.	.	0	1	0	.	1	1	1	0	1	1	1	1	1	.	1	0	1	.	1	0
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	1	1	1	1	.	.	.	.	.	.	1	1	1	1	1	1	.	.	1	1	1	.	1	.	1	1	1	1	0	0	1	0	1	0	1	0	0	0
70	.	.	0	1	0	.	1	0	.	.	0	0	.	.	0	0	0	.	0	0	.	.	0	.	.	.	0	0	0	.	.	.	0	.	.	.	.	.
71	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
64	0	0	0	0	0	0	.	.	0	.	2	1	1	1	1	1	0	1	.	.	.	.	.	.	.	.	.	.	.	0	.	.	1	1	0	.	.	1
65	0	1	0	1	0	2	0	1	2	.	1	1	1	1	.	.	0	.	0	0	1	1	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	1
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.
67	1	0	1	0	0	0	.	.	0	.	1	2	1	1	.	.	1	1	1	1	.	.	.	.	0	1	5	4	.	.	.	.	1	1	.	.	.	.
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	1	1	1	1	1	1	1	1	1	.	1	.	9	9	.	.	3	2	1	1	1	1	0	.	.	.	0	0	1	1	1	1	1	1	0	0	0	1
70	0	.	.	.	0	0	.	.	.	.	.	0	.	0	7	.	0	0	1	0	0	1	.	0	.	.	0	0	0	0	.	.	0	.	0	.	.	0
71	.	.	0	0	.	.	.	.	.	.	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	.	.	0	0	.	.	1	.	1	.	.	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
64	.	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	1	1	1	8	1	1	1	1
65	0	.	1	1	.	.	.	0	1	0	.	.	1	1	1	1	0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	2	1	2	1	1
66	.	.	1	1	.	.	.	1	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	0	1	1	1	1	1	1	1	0	1	0	1	1	1	1	.	.	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	2	1	2	1	0
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	0	1	1	1	1	1	1	1	.	1	.	1	1	1	1	.	.	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	0
70	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
71	1	0	1	1	1	1	1	1	.	.	1	1	.	.	.	.	0	0	1	1	0	1	1	1	1	1	.	.	0	0	.	.	1	3	.	.	1	0
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID
64	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0	.	.	0	0	.	.		.	F	4	7	1	2	BC	51
65	1	1	1	1	1	1	1	.	1	1	1	.	1	.	2	1	2	1	.	.	.	.	1	1		.	G	5	7	1	2	BC	56
66	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.		.		2	7	2	2	BC	57
67	1	0	1	1	.	.	1	.	1	0	1	1	1	0	1	1	1	0	1	.	.	.	.	.		.	G	5	7	2	2	BC	59
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.		4	7	2	2	BC	61
69	1	0	1	.	1	0	1	.	1	0	1	.	1	.	2	1	2	1	.	.	.	.	1	1		.	F	4	7	1	2	BC	65
70	1	.	0	.	.	.	0	.	1	.	0	.	1	.	.	.	.	.	.	.	.	.	.	.		.	C	4	7	2	1	BC	69
71	.	.	.	0	.	0	1	.	1	.	.	.	0	0	3	.	.	.	.	.	.	.	.	.		.	E	3	7	1	2	BC	72
72	1	1	.	.	1	1	1	1	1	1	.	.	1	1	2	1	1	1	1	1	1	1	1	1		.	E	7	7	1	2	BC	73

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
73	.	.	.	.	.	0	.	.	0	0	1	0	0	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	0	.	0	0	.	0	.	0	.	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	1	1	.	.	.	.	1	1	.	.	.	.	.	.
75	.	.	.	.	.	.	.	.	.	.	1	.	0	.	1	1	.	.	1	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
76	0	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	1	0	.	.	0	1	.	.	0	0	.	.	1	1
77	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	1	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	0	.	.	.	.	.	1	.	1	.	1	.	.	.	0	.	.	.	1	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	5	.	0	.	0	.	.	.	.	0	.	0	.	.	.	0	.	0	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	1	1	.	.	0	1	0	1	0	0	0	0	1	.	0	1	1	0	0	0	1	.	0	0	1	.	0	0
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76	0	0	1	1	.	.	.	.	.	.	1	1	1	1	0	1	0	1	0	0	1	0	.	.	0	.	0	0	1	0	0	.	0	.	0	0	0	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	0	0	.	.	1	0	.	.	.	0	.	.	.	0	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	0
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	0	.	0	0	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	.	0
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76	0	0	0	0	.	.	0	0	.	0	1	1	.	1	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	0	0	0	0	.	.	.	.	.	.	1	1	0	0	1	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	1
80	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	0	.	.	0	0

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	0	0	.	.	.	.	.	.	1	0	1	2	1	0	.	.	1	0	1	0	0	0	0	0	.	.	0	0	.	.	.	.	0	1	0	1	1	0
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76	.	.	.	.	.	.	.	.	.	.	2	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	0	1	0	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	0	.	1	1	1	1	1	0	1	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	0	0	.	.	0	0	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPHAL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE	BURID	
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.		7	7	2	1	BC	75	
74	1	1	0	0	1	0	0	0	0	.	0	.	0	0	0	0	0	0	.	.	.	.	.	.		.	C	3	7	1	1	BC	76	
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.		7	7	1	2	BC	78	
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	F	M2	7	2	2	NN	1	2
77	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E	M4	7	2	2	NN	1	4
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		E1	7	1	7	NN	1	6
79	0	.	.	.	0	0	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	SIR	93	I	M1	7	2	3	NN	1	8
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E	M1	7	1	2	NN	1	8A
81	0	.	.	.	0	.	0	.	0	0	0	.	0	0	0	.	0	0	.	.	.	.	.	.	SIR	93		M4	7	2	7	NN	1	9

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
82	.	.	.	.	.	1	.	.	1	1	.	.	.	.	.	1	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	4	4	.	4	0	0	0	0	.	0	0	0	1	0	.	1	0	1	0	0	1	0	1	0	1	1	.	.	0	0	.	.	0	0	.	0	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	1	.	1	.	.	.	.	0	.	.	.	.	.	.	1	1	1	0	0	0	1	.	1	.	1	1	.	.	.	.	.	.	0	0	.	.	.	.
89	.	.	0	0	.	.	.	0	.	.	.	0	.	0	.	.	1	.	.	.	0	0	0	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.
90	0	.	0	0	0	0	.	0	1	1	.	0	.	0	0	.	0	.	.	.	1	1	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0	0
83	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	.	0	0	.	.	1	0	1	0	0	0	1	0	1	.	1	0	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	0	0	0	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	1	1	0	.	0	0	.	.	1	0	.	.	1	0	1	.	0	0	.	.	0	0
89	.	.	0	1	0	1	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	0	.	.	.	0
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
82	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	.	0	1	1	1	.	.	1	0	1	0	1	1	1	0	1	.	.	1	1	0	1	0	0	1	0	1	0	1	.
84	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.	0	.	.	.	0
85	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	0	0	.	0	.	.	.	.	.	.	0	.	1	1	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	0	0	0	.	.	0	0	.	0	0	0	0	1	.	0	0	0	.	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
89	0	0	0	0	.	.	0	0	.	0	0	0	0	0	.	0	0	0	.	.	0	0	.	.	.	.	.	.	0	.	.	.	1	.	.	.	.	.
90	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
82	0	0	.	.	1	0	0	.	.	.	1	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.
83	1	0	1	1	1	1	1	0	.	.	1	0	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.
84	.	0	0	0	0	0	0	0	0	.	1	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	0	.
85	.	.	.	.	1	1	1	.	.	.	.	.	0	0	0	0	.	.	.	.	0	0	1	0	.	.	.	.	.	.	1	1	1	.	.	.	.	.
86	.	.	0	0	0	0	0	0	0	.	0	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	1	1	.	.	.	.	1	1	.	.	1	0	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	0	.	.	1	.
89	0	0	1	1	.	.	.	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	.
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODED	PERIOD	CARD7	SEX	AGE	SITE		BURID
82	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	SIR	93		M5	7	1	7	NN	1	10
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E	M5	7	1	2	NN	1	12
84	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M4	7	2	7	NN	1	15
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	D	M4	7	1	1	NN	1	16
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M4	7	2	2	NN	1	17
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E	M4	7	2	2	NN	1	18
88	.	.	1	.	.	.	1	.	.	.	1	.	.	.	0	0	.	.	0	0	.	.	0	.	SIR	93	F	M4	7	1	2	NN	1	22
89	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	.	.	.	.	0	SIR	93	C	M5	7	2	1	NN	1	23
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	F	M3	7	2	2	NN	1	24

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	1	.	1	1	1	.	0	0	0	.	1	.	.	.
93	.	.	0	.	.	.	.	0	.	0	.	0	.	0	0	1	0	.	0
94	0	.	0	0	.	0	.	.	0	0	0	0	0	0	0	0	0	.	0
95	0	.	.	.	.	.	0	0	0	.	0	.	0	.	.	0	0	0	0
96	0	.	.	4	.	0	.	0	0	0	0	0	0	0	.	0	1	1	1
97	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.
98	0	0	.	.	0	2	.	1	1	.	1	1	1	1	.	.	1	2	.
99	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	0	0	.	0

OBS	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	0	0	0	.	0	0	.	.	0	1	.	.	.	.	.	.	.	.
93	.	0	.	0	0	0	0	0	0	.	.	0	0	0	0	.	.	.	.
94	.	0	0	0	0	0	0	.	.	0	0	.	.	.	.	.	.	.	.
95	0	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
96	0	1	0	1	0	0	0	.	.	.	.	.	.	0	0	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	1	2	1	2	1	1	1	.	.	.	.	0	1	1	0	.	.	1	1
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
93	.	.	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0
94	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.
95	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0
96	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	1	1	.	.	1	1	1	1	1	1	1	1	1	1	0
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	.
93	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	.	0	0
94	.	.	.	1	.	0	0	0	.	.	.	1	.	.	.	.	0	.	.
95	0	0	0	1	.	0	0	.	0	0	0	.	.	0	.	.	.	.	.
96	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	.	.	0	0
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.
92	.	.	0	0	0	0	0	0	.	.	0	0	0	0	.	.	0	0	1
93	.	.	0	0	.	.	0	0	.	0	0	0	0	.	0	0	0	0	.
94	0	0	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	0	.
95	0	0	0	0	.	.	0	0	.	.	0	0	0	0	.	.	0	0	0
96	0	0	0	0	.	.	0	0	.	.	.	.	0	0	.	.	0	0	0
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	0	0	0	0	0	0	0	0	.	0	1	1	2	2	.	0	0	0	1
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LFEMCONM	RFEMCONL	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
92	0	1	0	0	0	.	.	.	.	1	0	1	0	.	.	1	1	.	.
93	.	0	0	.	0	0	0	0	0	.	.	0	0	0	0	.	0	.	0
94	.	.	.	0	0	.	.	.	.	0	0	.	.	0	0	.	.	.	.
95	.	0	0	0	0	1	0	.	.	.	.	0	.	.	.	.	.	.	.
96	0	0	0	0	0	.	.	0	0	0	0	0	0	0	1	0	0	.	1
97	.	.	.	.	.	4	0	.	.	.	.	.	.	.	.	.	.	.	.
98	1	1	1	.	0	.	.	.	.	1	1	.	.	1	1	.	.	.	1
99	.	1	.	.	0	.	.	.	0	.	.	.	.	1	1	.	.	.	0

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
94	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.
95	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	0	0	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	0
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	0	1	1	1	1	1	1	1	0	1	.	.	.	1	1	1	1	1
99	.	.	0	0	0	0	0	0	1	.	1	0	.	.	0	0	0	0	1

OBS	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0
99	0	0	0	0	0	0	0	.	.	0	0	.	.	0	0	0	.	1	0

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M1	7	1	7	NN	1	25A
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	D	E3	7	1	1	NN	1	26
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	SIR	93	C	M2	7	2	1	NN	1	28
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	B	M1	7	2	1	NN	1	30
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	C	M5	7	2	1	NN	1	31
96	0	0	0	0	0	.	0	0	1	.	0	0	0	.	0	0	0	0	.	.	0	0	0	0	SIR	93	F	M5	7	1	2	NN	1	34
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M3	7	1	7	NN	1	38
98	1	0	1	.	1	.	1	0	1	0	.	.	1	0	0	0	0	0	.	.	.	.	.	.	SIR	93	I	M8	7	2	3	NN	1	40
99	0	.	0	0	0	.	0	0	0	.	0	0	1	.	0	0	.	.	.	.	.	.	0	.	SIR	93		M8	7	2	2	NN	1	41

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
100	0	0	.	.	0	0	.	.	1	.	0	.	0	.	1	.	.	.	.	.	.	0	.	.	0	.	.	.	0	0	1	1	1	1	.	1	.	.
101	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	1	0	1	2	.	.	.	.	.	.	.	.	.	.	.	.
102	.	0	0	0	.	.	.	0	.	1	.	1	.	1	.	.	0	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
103	0	0	7	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	1	1	0	0	0	.	.	0	0	1	0	.	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.
105	.	.	.	.	0	0	.	1	.	1	.	1	.	.	0	0	.	0	.	.	1	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	0	0	.	0	.	.	1	0	.	1	.	.	.	.	.	.	0	0	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
100	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	1	1	0	0	1	0	1	0	.	0	1	0	0	0	.	.	0	0	1	0	.	0
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	1	0	0	0	1	.	1	0	.	.	.	.	1	.	0	0	1	0
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	0	0	.	.	1	0	.	.	1	0	.	.	.	.	.	.	0	0
105	.	.	.	.	.	.	.	.	.	.	1	1	.	.	1	1	.	.	1	0	.	.	.	.	1	0	.	.	1	0	.	.	.	.	.	.	0	.
106	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	0	0	0	.	.	.	0	0	0	0	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
100	0	0	0	0	.	.	0	0	.	0	1	0	1	1	.	.	0	1	.	.	1	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	1	1	.	.	0	0	0	0	1	1	0	.	.	0
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	1	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	0	0	.	.	.	.	.	.	1	1	1	1	.	.	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1
104	.	.	.	.	.	.	.	.	.	.	.	1	.	4	.	.	.	1	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.
105	.	.	0	0	.	.	.	.	.	.	1	.	1	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	2	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	0	.	.	.	.	.	.	.	.	1	0	.	.	0	0	.	.	.	.	.	.	1	1	.	.	.	0	.	.	0	.	0	.	.	.
108	0	0	0	0	.	.	0	0	.	.	1	1	1	.	.	.	0	.	1	1	.	.	.	.	.	.	0	0	.	.	.	.	.	0	.	.	.	0

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	0	.	1	1	1	1	1	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	.	.	0	0	0	0	0	1	1	.	1	0
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	1	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	1	1	1	0	4	1	0	0	1	1	0	0	0	0	1	0
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	0	1	1	.	.	.	1	0	.	.	1	0	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	0	0	.	.
108	.	.	1	1	1	1	1	1	1	.	1	.	0	0	.	.	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	0	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E	M7	7	2	2	NN	1	43
101	1	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0	1	0	.	.	.	.	.	.	SIR	93		M7	7	2	2	NN	1	44
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M8	7	2	2	NN	1	47
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	SIR	93	E	M4	7	1	2	NN	1	48
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	I	M8	7	2	3	NN	1	49
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	F	M4	7	1	2	NN	1	50
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M8	7	1	7	NN	1	51
107	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	.	.	.	.	.	SIR	93		M3	7	2	7	NN	1	53
108	0	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	I	M2	7	2	3	NN	1	54

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
109	0	0	0	.	.	0	4	0	1	0	0	0	0	0	.	0	0	.	0	.	1	0	1	0	0	0	.	.	.	.	0	0	.	.	.	.	.	.
110	0	.	0	0	.	0	.	.	.	0	0	1	0	1	0	.	0	0	.	0	0	.	0	.	0	0	.	.	.	.	1	1	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	0	.	.	.	0	.	.	.	.	0	0	0	0	0	0	.	.	.	.
112	0	0	.	0	0	0	0	0	0	0	0	0	0	.	0	.	0	0	.	.	0	.	0	.	0	0	0	0	0	0	0	0	.	.	.	.	.	.
113	.	.	0	4	.	1	.	1	.	1	0	0	0	0	.	.	0	.	.	.	1	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
114	.	0	.	0	.	.	.	0	0	0	1	1	0	0	0	1	0	0	0	0	0	.	0	.	0	0	0	0	.	.	0	0	0	0	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	.	0	.	0	.	.	.	.	1	0	.	.	.	.	.	.	.	.
116	0	0	.	.	.	0	.	0	0	1	0	0	0	0	0	0	0	.	0	.	1	0	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTAPMC	LTRAPCAR	LTAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
109	.	.	.	.	0	0	0	0	.	.	.	.	.	.	0	1	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0
110	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	0	0	.	.	.	0	.	.	.
111	.	.	.	.	1	0	.	.	.	.	0	0	.	.	.	.	0	1	.	.	0	0	.	.	0	0	.	.	1	0	0	0	1	0	0	0	0	0
112	.	.	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	1	.	.	0	0	0	0	0	0	.	0	0	0	0	.	.	0	0	.	0	.	.	.
115	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	0	.
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	.	0	0	0	.	0	0	.	.	.	.	.	0	0
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
109	0	0	0	0	0	0	0	0	.	0	.	.	.	0	.	.	0	0	.	1	.	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	.	.
110	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	0	0	.	.	0	0	.	.	.	2	.	1	.	1	.	0	.	.	2	1	1	1	2	1	2	1	.	.	1	.	1	1	.	.	0	0
112	0	0	.	.	0	0	.	.	.	.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	.	0	0	0	.	.	0
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	0	0	0	0	0	0	0	0	.	.	0	0	.	0	.	.	0	0	0	0	0	0	0	0	.	.	0	0	0	0	.	.	1	1	.	.	.	0
115	.	.	0	0	.	.	0	0	.	.	.	0	.	0	.	.	.	0	.	.	1	0	.	0	.	.	0	0	.	.	0	0	.	1	.	0	.	.
116	.	.	0	0	.	.	0	0	.	.	1	1	1	1	.	.	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
109	.	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	.	.	.	.	0	0	1	0	2	.	.	.
110	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	.	0	.
111	.	0	1	1	1	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	.	.	0	0	.	.	1	2	1	1
112	0	0	1	0	0	0	0	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	0	0	.	.	0	0	0	0	0	.	0	0	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	0	0	0	0	0	0	0	0	1	0	1	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	0	1	0	0	0	0	.	.	0	.
115	0	0	.	.	0	0	0	.	.	.	1	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	0	1	0	0	1	0
116	0	0	0	1	0	1	1	0	1	0	1	0	.	.	0	0	.	.	0	0	0	0	.	.	0	0	.	.	0	0	.	.	1	0	0	0	0	.
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODED	PERIOD	CARD7	SEX	AGE	SITE	(blank)	BURID
109	0	.	.	.	0	.	0	.	0	.	0	.	0	.	0	0	0	0	.	.	.	.	.	.	SIR	93	E	M3	7	1	2	NN	1	55
110	.	.	.	.	1	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	F	M2	7	2	2	NN	1	59
111	1	1	1	.	1	0	.	0	0	.	1	.	1	1	3	1	2	1	.	.	.	.	.	.	SIR	93	H	M2	7	2	3	NN	1	62
112	0	.	.	0	0	0	0	0	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	SIR	93	C	M3	7	2	1	NN	1	63
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	I	M4	7	1	3	NN	1	65
114	.	.	.	.	.	.	0	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	SIR	93	B	M2	7	1	1	NN	1	67
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	SIR	93	G	M3	7	1	2	NN	1	72
116	0	0	.	0	0	0	0	0	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.	.	SIR	93	F	M2	7	1	2	NN	1	77
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	G	M4	7	1	2	NN	1	78

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN
118	.	.	.	.	.	1	.	0	.	.	0	0	1	0	.	.	0	.	.
119	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	0	.	.	.	.	0	.	0	.	.	.	0	0	.
122	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0
123	.	.	.	.	.	.	.	0	0	0	1	1	0	0	.	1	0	.	0
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.
125	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.
126	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0

OBS	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
118	.	.	.	1	1	.	0	.	.	1	0	.	.	1	0	.	.	.	.
119	.	.	.	1	.	.	1	0	0	.	.	0	1	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	0	.	0	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0
123	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
124	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	0	0	.	0	0	0	0	0	0	.	.	0	0	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX
118	.	1	1	1	.	.	.	.	.	.	.	.	.	.	0	0	0	1	1
119	.	.	1	1	1	1	.	.	1	1	.	.	.	.	1	1	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	0	0	.	.	.	.	1	.	0	0	0	0	0	1	.	.	0
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	1	0	.	.	.	.	.	.	0	0	.	.	0
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0

OBS	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
118	0	.	.	.	0	.	1	1	.	.	.	1	.	.	.	.	.	.	.
119	.	.	.	1	.	.	.	1	.	1	0	.	.	1	.	.	.	0	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	0	.	.	0	.	.	.	0	0	.	.	0	0	0	0	0	0	0	0
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	1	.	.	0	.	.	.	1	0	.	.	1	0	.	.	0	0	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	0	0	0	0	.	0	0	0	0	.	0	0	0	0	0	0	.	0	0

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
118	0	0	0	0	1	0	.	.	.	.	0	0	0	0	.	.	0	0	1	.	0	1	.	.	0	0	0	0	0	.	0	0	.	.	.	.	.	.
119	.	.	1	1	.	.	1	1	.	1	1	.	2	.	.	.	0	.	.	.	1	.	.	.	1	1	1	1	.	.	.	.	1	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	1
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
122	.	.	0	0	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	1	1	0	0	.	.	0	0	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.
124	0	0	.	.	0	0	.	.	.	.	1	1	1	1	.	.	1	1	0	0	0	0	0	0	.	.	.	1	.	.	.	.	1	.	.	.	.	1
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	0	0	0	0	.	.	0	0	.	.	0	1	0	0	0	.	.	0	0	0	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
118	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	1	0	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	1	0	.	.
119	.	.	1	1	1	1	1	1	1	.	1	.	1	1	1	0	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	.	1	1	.	.
120	.	1	1	0	1	1	1	0	1	.	1	.	1	0	1	0	1	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	.	.
121	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODED	PERIOD	CARD7	SEX	AGE	SITE		BURID
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	I	E3	7	1	3	NN	1	81
119	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	SIR	93	I	M1	7	1	3	NN	1	88
120	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93		M4	7	1	7	NN	1	90
121	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IR	3			7	1	7	NN	1	C
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	G	M6	7	1	3	NN	2	1
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	F	E1	7	2	2	NN	2	4
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M4	7	1	2	NN	2	7
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M4	7	1	2	NN	2	9
126	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	D	E3	7	1	1	NN	2	10

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	1	1	.	.	1	.	0	0	.	.	0	0	0	0	.	.	.	.
130	.	.	.	.	.	0	.	.	.	.	1	.	0	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	0	.	1	.	0	1	.	.	0	.	.	.	.	0	1	.	1	.	.	.	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	0	0	0	0	.	0	.	0	0	.	0	0	1	.	0	.	.	0	.	0	0	0	.	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.
134	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	1	.	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	0	.	.	.	.	.	.	.	.	.	.	1	1	.	.	0	0	0	0	0	0	1	0	0	0	1	.	.	.	0	0	.	.	0	.	.	.
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	0	0	1	0	0	0	0	0	.	0	0	0	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	0	.	0	.	0	0	0	0	0	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0
129	0	0	0	0	0	0	0	0	.	.	1	1	.	.	.	.	0	.	.	.	.	.	1	.	0	1	0	1	1	1	.	.	.	.	.	.	.	.
130	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	0	0	.	.	0	0	.	.	.	1	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1	.	.	.	0
133	0	0	0	0	0	0	.	.	.	.	.	1	1	1	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	0
134	0	0	0	0	0	0	0	0	.	.	1	.	1	1	.	.	0	.	.	.	0	0	1	1	0	0	1	1	.	.	.	.	1	1	.	.	.	1
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTUL	RCALCCUB	LCALCTUL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
127	.	.	.	.	.	.	.	.	0	0	.	.	.	.	1	0	0	0	.	.	1	0	.	.	0	0	.	.	.	.	.	.	1	0	1	0	0	0
128	.	.	0	0	.	.	.	0	1	0	1	0	.	.	0	0	0	0	1	0	.	.	0	0	.	.	.	.	.	.	0	0	0	1	0	1	0	0
129	.	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	1	.	.	.	.	0	7	.	.	1	2	.	.	.	.	0	1	1	1	0	1
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	0	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	1	0	1	1	1	.	.	1	1	.	.	0	0	0	0	0	.
133	.	0	1	0	1	0	0	0	1	0	1	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	.	.
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.
135	.	.	.	.	0	1	1	.	.	.	1	0	0	0	.	.	.	.	0	1	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	1	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS
127	0	.	0	0	0	0	0	0	0	0	0	0	0	0
128	0	0	.	0	0	0	.	.	0	0	0	.	0	0
129	1	.	.	0	1	.	2	.	2	0	3	0	2	0
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	0	.	0	0	0	0	0	0	0	0	0	0	0	0
133	0	0	.	.	0	.	.	.	0	.	.	.	0	.
134	0	0	.	.	0	0	.	.	.	0	.	.	.	.
135	0	.	.	.	0	.	.	.	0	0	.	.	1	.

OBS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
127	0	0	0	0	.	.	.	.	.	.	NLV	94		M6	7	2	7	NN	2	11
128	1	0	1	0	.	.	.	.	.	.	NLV	94		M5	7	2	7	NN	2	17
129	0	0	0	0	.	.	.	.	.	.	NLV	94	F	M5	7	2	2	NN	2	21
130	.	.	.	.	.	.	.	.	.	.	NLV	94	F	M5	7	2	2	NN	2	22
131	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M5	7	1	2	NN	2	23
132	1	0	1	0	.	.	.	.	.	.	NLV	94		M6	7	1	2	NN	2	24
133	.	.	0	0	.	.	.	.	.	.	NLV	94	E	M6	7	1	2	NN	2	26
134	.	.	.	.	.	.	.	.	.	.	NLV	94	I	M6	7	1	3	NN	2	27
135	.	.	0	0	.	.	.	.	.	.	NLV	94		M4	7	2	7	NN	2	31

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
136	.	0	.	0	.	.	.	0	0	0	0	.	1	.	0	1	.	0	0	0	0	0	.	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	0	.	0	.	0	0	.	0	0	0	1	1	0	0	0	.	0	.	.	.	0	.	0	.	1	1	.	.	.	.	1	1	0	0	.	.	.	.
140	0	0	0	0	0	0	.	0	0	0	1	0	0	.	0	0	0	.	0	.	0	1	0	.	0	0	0	0	0	1	.	.	.	.	.	.	.	.
141	.	.	.	.	0	1	.	.	.	.	1	1	0	0	.	.	0	1	.	0	.	.	2	.	.	.	.	.	1	1	.	.	1	1	.	.	.	.
142	.	.	.	.	.	0	.	.	1	0	0	0	0	0	.	.	0	.	.	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
144	8	7	7	.	1	.	4	1	.	1	1	1	1	.	1	.	1	.	.	.	1	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0	0	0	0	.	0	.	.	.	0	0	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	0	0	0	.	0	0	0	0	0	.	0	.	0	0	.	.	0	0	0	0	0	0
140	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	0	.	.	0	0	0	.	0	0	0	.	.	.	0	0	.	.	.	.
141	.	.	.	.	.	.	1	1	.	.	1	1	.	.	.	.	1	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	.	0	0	0	.	.	.	0	.	.	.	0
143	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
144	.	.	.	.	.	.	.	.	1	1	.	.	.	.	1	1	.	.	.	.	1	1	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	0

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
136	0	0	0	0	0	0	0	0	.	.	.	0	0	0	.	.	.	0	.	.	.	.	.	.	.	.	0	0	0	0	.	.	1	0	0	.	0	0
137	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	0	0	.	.	.	.	0	0	1	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	1	.	.	.	.	.
139	0	0	0	0	0	0	0	0	.	.	1	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	1
140	0	0	0	0	0	0	0	0	0	0	0	.	1	1	.	.	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	1	1	.	1	.	1
141	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	.	1	.	1	.	.	.	1	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
													.	.	.	.	.	.	.	1	1	1	.	.	0	0	0	0	0	0	0	0	1	1	.	.	.	.
144	.	.	1	0	.	.	0	0	.	.	.	1	.	1	.	.	.	1	.	.	2	1	.	1	1	1	2	1	.	.	1	.	1	1	.	.	.	1

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
136	.	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	.	.	0	0	0	1	0	0	0	0
137	.	.	.	.	0	0	0	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	0	0	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	1	1	.	1	0	1	0	0	.	1
140	.	1	1	1	1	1	1	1	1	0	1	1	.	.	.	.	1	0	.	.	1	1	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	.
141	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	0	1	1	.	.	.	0	1	0	.	.	1	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0
144	.	2	1	1	1	1	1	1	1	1	.	.	2	2	.	.	2	2	.	.	1	2	1	1	.	.	1	1	3	2	1	1	1	1	1	1	1	2

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	NLV	94	C	M4	7	1	1	NN	2	32
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	NLV	94		M4	7	2	7	NN	2	37
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M4	7	1	7	NN	2	38
139	0	1	0	1	.	1	0	1	0	1	0	1	0	0	0	0	0	.	.	0	0	.	.	.	NLV	94	I	M4	7	2	3	NN	2	39
140	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	F	M1	7	1	2	NN	2	41
141	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	I	E2	7	1	3	NN	2	42
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M6	7	2	2	NN	2	43
143	.	.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	.	.	.	.	NLV	94		E1	7	2	7	NN	2	45
144	1	1	1	1	1	.	2	.	1	3	2	1	1	1	3	1	3	1	.	.	.	.	.	.	NLV	94	G	M4	7	1	2	NN	2	47

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	0	0	.	.	0	0	0	0	0	.	.	.	.	.	.	1	.	.	0	.	.	.	0	0	.	.	.	.	.	.	0	1	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	0	.	1	.	.	.	.	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
148	1	0	1	0	0	0	0	0	.	.	0	.	0	.	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
149	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4	.	.	0	0	.	.	0	0	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	0	.	.	.	.
151	0	.	0	.	.	.	.	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.
152	0	0	0	.	.	.	0	.	.	0	.	0	.	0	.	.	.	0	.	0	.	.	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
153	.	.	.	.	.	0	.	0	0	.	0	0	0	.	.	.	1	.	.	.	.	0	1	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.
147	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
149	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	0	0	.	0	.	0	0	0	.	0	0	0	0	.	0	0	0	.	0	0	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	0	0	0	.	.	.	.	.	.	.	.	.
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
145	.	.	.	.	.	.	.	.	.	.	1	1	2	.	.	.	0	.	0	0	0	0	1	1	.	.	.	.	0	0	.	.	.	.	1	.	.	.
146	0	0	.	.	0	0	.	.	.	1	.	1	1	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	0	.	.
147	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.
149	0	0	0	0	0	0	.	.	0	.	0	0	.	.	0	0	.	.	.	0	.	.	.	.	.	.	0	0	0	0	.	.	0	.	.	.	.	0
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
151	.	.	.	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	0	0	0	0	0	0	.	.	.	.	0	0	.	.	0	0	0	0	0	0	.	.	0	.	0	0	0	0	.	.	0	.	.	0	.	0	0	0
153	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	.	0	0	0	0	0	.	0	0	.	.	1	0	.	.	0	.	1	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	0	0	.	.	0	.	.	.	0	0	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	1	0
147	.	.	.	.	0	0	0	.	.	.	1	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
149	.	.	0	0	0	0	0	0	0	0	0	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	.	0	.
150	.	.	0	0	.	.	.	0	0	0	.	.	.	.	1	0	0	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	0	0	.	.	0	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	0	1	1	1	1	1	0	1	0	1	0	.	.	0	0	0	0	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	0	0	0	0	.
153	.	.	1	1	.	.	.	0	1	0	.	.	1	1	1	1	0	0	.	.	.	.	.	.	.	.	.	.	0	1	.	.	.	0	.	.	1	0

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPHAL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	F	M6	7	2	2	NN	2	48
146	.	0	1	0	.	0	1	0	.	0	1	0	.	.	0	0	0	0	.	.	.	.	0	.	NLV	94	I	M5	7	1	3	NN	2	49
147	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	H	E3	7	2	3	NN	2	52
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M4	7	1	2	NN	2	55
149	.	.	.	.	.	.	0	.	.	.	0	.	.	.	0	0	.	.	.	.	.	.	0	.	NLV	94	C	M6	7	1	1	NN	2	56
150	.	.	.	.	0	.	0	.	0	.	0	.	0	.	0	0	0	0	.	.	.	.	.	.	NLV	94		M6	7	2	7	NN	2	57
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M6	7	2	2	NN	2	58
152	0	.	0	.	.	.	0	.	0	0	0	0	0	.	0	0	.	.	.	.	.	.	.	.	NLV	94	B	M5	7	2	1	NN	2	59
153	.	.	1	0	.	.	1	0	.	.	1	0	.	.	0	0	.	.	0	0	.	.	0	.	NLV	94	C	M6	7	2	1	NN	2	60

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
154	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	0	1	.	.	0	1	.	.	.	.	.	.
155	0	.	.	.	0	1	.	0	.	.	0	0	0	0	.	1	1	0	1	0	1	2	1	.	1	1	.	.	.	.	0	1	.	.	.	.	.	.
156	1	0	0	0	0	0	0	0	1	1	1	0	1	0	.	.	0	.	.	.	1	.	1	0	.	1	.	.	0	0	.	.	0	0	0	0	.	.
157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	0	1	.	1	0	.	.	1	1	.	.	1	1	1	1	.	.	.	.
158	.	.	.	.	.	0	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	.	0	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	.	0	1	.	.	.	.	0	0
161	4	.	0	.	.	0	.	0	0	0	.	0	.	0	0	1	0	.	1	.	0	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	0	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPPMC	LCAPCAR	LCAPPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
154	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	0	1	.	.	.	.	.	1	0	.	.	.	0
155	.	.	.	.	.	.	1	1	.	.	1	1	.	.	1	0	.	.	.	.	1	0	0	.	1	.	1	.	1	0	1	.	1	0	1	.	.	0
156	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	1	0	0	0	.	.	0	0	.	.	0	0	.	.	.	.
157	.	.	.	.	.	.	.	.	.	.	.	.	1	1	:	.	1	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	1	0
158	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	0	0	.	.	1	0	.	.	.	0	.	.	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	0	1	0	.	.	0	0	.	.	0	0	.	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
154	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
155	.	.	0	0	.	.	.	.	.	.	1	1	.	.	.	.	.	1	1	1	.	.	1	.	0	0	0	0	.	.	0	.	1	1	.	.	1	1
156	0	0	0	0	.	.	0	0	.	0	1	.	1	.	1	1	0	0	0	0	0	0	0	0	.	.	0	0	.	.	0	.	.	1	.	.	.	.
157	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	1	.	.	0	0	.	.	1	1	.	.	1	1
158	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	0	.	1	1	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
154	.	.	.	.	0	1	1	.	.	.	.	.	1	1	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	.
155	1	0	1	1	1	1	1	1	1	1	1	1	1	1	.	.	1	1	.	.	1	1	.	.	1	1	1	1	.	.	.	.	1	3	.	3	.	.
156	.	.	0	1	0	1	1	0	1	0	1	0	.	.	1	0	0	0	.	.	0	1	1	1	.	.	1	1	1	0	.	.	1	0	0	0	1	0
157	.	1	1	1	1	1	1	1	1	0	1	0	.	.	1	1	.	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
154	.	.	.	0	.	.	1	.	.	.	1	0	1	.	0	0	0	0	.	.	.	.	.	.	NLV	94	I	M6	7	1	3	NN	2	61
155	.	.	1	0	.	.	.	.	1	.	1	.	1	.	0	0	2	.	.	.	.	.	.	.	NLV	94	G	E1	7	1	2	NN	2	62
156	0	.	1	0	0	.	0	0	0	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	NLV	94	E	M1	7	1	2	NN	2	64
157	1	0	.	.	.	.	1	.	1	.	0	.	1	.	0	0	0	0	.	.	.	.	.	.	NLV	94	E	M6	7	1	2	NN	2	67
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	G	M6	7	2	2	NN	2	68
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M6	7	2	7	NN	2	69
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	I	M6	7	1	3	NN	2	70
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M1	7	2	2	NN	2	71A
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M1	7	1	2	NN	2	71B

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RCLAVMED	RCLAVDIS	LCLAVMED	LCLAVDIS	RSCAPACR	RSCAPGLN	LSCAPACR	LSCAPGLN	RHUMHEAD	LHUMHEAD	RTROCH	LTROCH	RCAPIT	LCAPIT	RRADPRX	RRADDIS	LRADPRX	LRADDIS	RRADULN	LRADULN	RULNPRX	RULNDIS	LULNPRX	LULNDIS	RULNRAD	LULNRAD	RLUNULN	RLUNCAR	LLUNULN	LLUNCAR	RSCAPHR	RSCAPHC	LSCAPHR	LSCAPHC	RPISI	LPISI	RTRIQCAR	RTRIQPIS
163	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
164	.	.	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	0	.	0	0	.	0	.	.	0	.	0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	0	.	0	1	.	0	0	0	.	1	1	0	.	1	.	1	1	1	.	1	1	.	.	0	.	0	0	0	0	.	.	0	0
167	.	.	.	0	0	0	.	0	0	0	0	0	0	0	.	0	0	0	0	0	0	.	0	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	0	0	.	.	0	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	0	1	.	.	1	.	1	.	1	.	1	2	1	2	1	1	2	1	2	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	0	.	.	0	0	.	.	.	.
171	.	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.
172	0	0	0	.	0	2	.	.	1	.	1	.	0	.	1	1	.	.	1	.	2	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	0	0	.	.	.	.	.	.	.	.
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	0	0	4	.	.	0	.	0	1	0	1	1	1	1	0	0	0	.	0	.	1	1	1	.	1	1	.	.	.	.	0	0	.	.	.	.	.	.
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	0	0	0	0	0	0	.	0	0	.	0	.	0	.	0	0	0	.	.	.	1	0	.	.	1	.	.	.	.	0	.	.	.	.	.	.	.	.
179	.	.	.	.	.	0	.	0	.	.	0	0	0	0	0	1	.	.	1	.	1	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
180	4	0	4	0	4	0	.	.	0	0	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.
181	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LTRIQCAR	LTRIQPIS	RTRAPCAR	RTRAPMC	LTRAPCAR	LTRAPMC	RTRAPZC	RTRAPZMC	LTRAPZC	LTRAPZMC	RHAMCAR	RHAMMC	LHAMCAR	LHAMMC	RCAPCAR	RCAPMC	LCAPCAR	LCAPMC	RMC1PRX	RMC1DIS	LMC1PRX	LMC1DIS	RMC2PRX	RMC2DIS	LMC2PRX	LMC2DIS	RMC3PRX	RMC3DIS	LMC3PRX	LMC3DIS	RMC4PRX	RMC4DIS	LMC4PRX	LMC4DIS	RMC5PRX	RMC5DIS	LMC5PRX	LMC5DIS
163	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	1	0	.	.	1	0	.	.	0	.
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	1	1	1	1	.	.	.	.	1	1	1	0	.	.	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	.	1	0	0	.
167	.	.	1	1	.	.	.	.	0	0	.	.	0	0	.	.	0	0	0	0	0	0	0	.	.	.	.	.	0	0	0	0	.	.	0	0	0	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.
169	.	.	1	0	.	.	.	.	.	.	1	1	1	1	.	.	1	0	.	.	.	.	0	1	1	.	1	1	1	0	1	0	1	0	1	1	1	0
170	.	.	0	0	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	0	0	.	.	.	0	.	0	0	0	0	0	.	0	0
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	0	1	.	.	.	.	.	.	.	.	.	.	1	1	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	1	.
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	0	.	.	.	0	0	.	.	.	.
180	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.

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APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	RHPHAL1P	RHPHAL1D	LHPHAL1P	LHPHAL1D	RHPHAL2P	RHPHAL2D	LHPHAL2P	LHPHAL2D	RHPHAL3P	LHPHAL3P	RAURICUL	LAURICUL	RACETAB	LACETAB	RALA	LALA	RFEMHEAD	LFEMHEAD	RFEMCONM	RFEMCONL	LFEMCONM	LFEMCONL	RFEMPAT	LFEMPAT	RPATMED	RPATLAT	LPATMED	LPATLAT	RTIBMED	RTIBLAT	LTIBMED	LTIBLAT	RDISTIB	LDISTIB	RTIBFIB	LTIBFIB	RFIBTIB	RFIBTAL
163	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
164	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	0	0	0	0	0	0	.	.	.	.	1	1	0	.	.	.	0	0	.	.	.	.	.	.	0	0	0	1	.	.	.	.	1	.	.	.	.	0
167	0	0	0	0	.	.	.	.	.	.	0	0	0	0	.	0	0	0	0	.	0	.	0	0	.	.	.	.	0	0	0	0	1	1	0	0	0	0
168	0	0	0	0	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	.	0	0	.	.
169	0	0	1	0	.	.	1	.	.	.	1	1	1	1	.	.	0	0	1	1	1	0	1	0	.	.	.	0	.	0	0	0	1	1	2	2	.	1
170	0	0	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	0
171	.	.	0	0	.	.	.	.	.	.	.	.	1	.	.	.	1	1	0	1	0	0	0	0	.	1	.	.	1	0	.	.	1	1	0	.	1	0
172	0	0	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
173	0	0	.	.	.	.	.	.	.	.	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	0	0	0	0	0	0	0	0	.	.	1	1	.	1	1	1	1	1	.	.	.	.	.	.	1	0	1	0	.	.	.	.	.	.	.	.	.	1
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	0	0	.	.	0	0	.	.	.	0	1	.	.	0	0	0	.	.	.	.	0	.	0	0	.	.	0	0	0	0	0	.	0	.	.	0
179	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	0	0	.	.	0	0	.	.	.	.	2	1	.	.	0	0	0	.	.	0	0	.	.	0	0	0	0	0	0	0	1	1	.	0	.	1
181	.	.	0	0	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0

APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LFIBTIB	LFIBTAL	RTALTIB	RTALCALC	LTALTIB	LTALCALC	RTALHEAD	LTALHEAD	RCALCTAL	RCALCCUB	LCALCTAL	LCALCCUB	RNAVTAL	RNAVCUNI	LNAVTAL	LNAVCUNI	RCUBCALC	RCUBMT	LCUBCALC	LCUBMT	RCUN1TAR	RCUN1MT	LCUN1TAR	LCUN1MT	RCUN2TAR	RCUN2MT	LCUN2TAR	LCUN2MT	RCUN3TAR	RCUN3MT	LCUN3TAR	LCUN3MT	RMT1PRX	RMT1DIS	LMT1PRX	LMT1DIS	RMT2PRX	RMT2DIS
163	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	0	1	.	.	.	0	1	1	.	.	0	0	.	.	0	0	.	.	1	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0
167	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	.	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168	.	0	0	0	.	.	.	0	1	0	.	.	1	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	1	.	1	0	0	.
169	.	1	1	1	1	1	1	1	1	0	1	1	.	.	.	.	.	.	1	1	1	1	1	1	.	.	1	1	1	1	1	1	1	.	1	0	1	1
170	.	.	0	1	.	.	.	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.
171	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
173	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	1	0	0	0	0	0	0	0	0	0	1	0	.	.	1	0	0	0	0	0	.	.	0	0	.	.	.	.	.	.	0	2	0	2	0	0
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	1	0	0	0	0	0	1	.	1	.	.	.	1	0	.	.	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	.	.	1	.	.	.	.	.	1	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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APPENDICULAR OSTEOARTHRITIS IN NORTHEASTERN THAILAND ADULTS

OBS	LMT2PRX	LMT2DIS	RMT3PRX	RMT3DIS	LMT3PRX	LMT3DIS	RMT4PRX	RMT4DIS	LMT4PRX	LMT4DIS	RMT5PRX	RMT5DIS	LMT5PRX	LMT5DIS	RFPHAL1P	RFPHAL1D	LFPHAL1P	LFPAHL1D	RFPHAL2P	RFPHAL2D	LFPHAL2P	LFPHAL2D	RFPHAL3P	LFPHAL3P	INSTCODE	YEAREXAM	AGECODE	PERIOD	CARD7	SEX	AGE	SITE		BURID
163	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M1	7	1	7	NN	2	73
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	B	M1	7	2	1	NN	2	75
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	M1	7	1	2	NN	2	76
166	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	0	0	.	.	.	.	.	.	NLV	94	F	E2	7	2	2	NN	2	78
167	0	.	0	0	0	0	0	.	0	0	0	.	0	.	0	0	0	0	.	.	.	.	.	.	NLV	94	B	E3	7	2	1	NN	2	79
168	0	.	0	0	0	.	0	.	.	.	0	0	0	.	0	0	0	0	.	.	.	.	.	.	NLV	94	D	E1	7	2	1	NN	2	83
169	1	0	.	.	1	.	1	.	1	0	1	1	1	1	1	0	1	0	1	0	.	.	.	.	NLV	94	G	M4	7	1	2	NN	2	85
170	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	NLV	94		M4	7	2	7	NN	2	86
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		E2	7	2	2	NN	2	88
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	I	E2	7	1	3	NN	2	89
173	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	I	E3	7	1	3	NN	2	90
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M5	7	1	7	NN	2	95
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M5	7	2	7	NN	2	98
176	.	2	0	0	1	0	1	0	1	0	0	0	2	0	1	0	2	0	.	.	.	.	.	.	NLV	94	F	M1	7	2	2	NN	2	103
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94		M1	7	2	7	NN	2	108
178	1	0	0	1	.	0	.	.	1	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	NLV	94	E	M1	7	1	2	NN	2	110
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	H	E3	7	2	3	NN	2	117
180	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	NLV	94	E	M4	7	2	2	NN	2	124
181	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E	E1	7	2	2	NN	2	M125

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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5	.	.	.	.	0	.	.	.	.	.	0	.	0	.	0	.	0	.	0	.	0	0	0	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.
6	.	.	.	.	.	1	.	.	.	.	.	0	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	1	.	.	.	0	.	.
7	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	.	.	0	.	.	.	0	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	LRIB10TU	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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8	.	.	.	.	.	.	.	.	.	0	0	4	.	0	0	2	.	1	.	1	1	0	1	0	1	0	0	4	0	0	.	.	0	0	0	0	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5BODINF	C5RSUP	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	T3LSUP	T3LINF	T4RRIB	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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6	0	0	0	.	4	4	0	.	.	1	4	.	4	4	0	0	0	1	.	.	.	.	.	.	.	1	4	.	4	4	0	.	.	.	0	0	4	4	0
7	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	.	0	.	0	.	0	0	0	0	0	.	.	.	.	.	0	.	0	.	.	0	0	0
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T8RINF	T8LSUP	T8LINF	T9RRIB	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSU	L1BODIN	L1RSUP	L1RINF
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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5	1	.	1	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	0	0	.	.	1	1	1	0	0	.	.	0	1	0	1	.	.	.	0
6	0	0	0	4	4	.	.	.	1	.	.	4	4	.	.	4	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	0	0	0	.	.	0	0	0	0	0	0	.	0	.	.	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	1	0	1	0	0	0	0
8	.	.	.	0	.	0	0	.	.	0	1	1	1	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L1LSUP	L1LINF	L2BODSU	L2BODIN	L2RSUP	L2RINF	L2LSUP	L2LINF	L3BODSU	L3BODIN	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSU	L4BODIN	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSU	L5BODIN	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	9	7	2	1	BC1	2
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	2	1	BC1	4
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	1	2	BC1	6
4	1	1	.	.	0	1	0	1	4	4	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	1	2	BC1	7
5	0	0	.	.	.	1	0	.	.	.	.	.	.	0	.	.	1	.	1	.	.	.	1	.	1	4	.	.	.		.	6	7	2	2	BC1	8
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	1	2	BC1	9
7	0	0	0	0	0	0	0	0	.	.	0	1	1	0	.	.	0	1	0	0	.	.	1	0	1	0	.	.	0		.	7	7	2	1	BC1	11
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.	0	0	.	.	.	.	.		.	5	7	1	2	BC1	12
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	1	7	BC1	13

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LRIB10TU	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	0	.	0	.	0	.	0	1	.	1	.	0	0	0	0	0	0	.	.	.	.	.	0	.	.	.	0	.	.	.
12	.	.	.	.	.	.	.	.	.	.	1	.	0	0	0	.	.	.	.	.	0	.	.	.	0	0	.	.	.	.	.	0	.	.	0	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	0	1	1	1	1	0	4	1	1	1	1	8	0	1	1	1	1	8
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	1	1	4	.	.	0	1	1	1	1	1	1	.	1	1	1	1	1	0	1	1	1	1	4	0	1	1	1	1	4
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5BODINF	C5RSUP	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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15	7	1	1	1	1	8	1	0	1	.	.	4	4	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	4	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	.	.	0	1	0	1	2	2	0	4	1	1	1	1	1	1	.	4	1	1
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T3LSUP	T3LINF	T4RRIB	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	1	1	.	.	4	4	1	.	1	1	.	1	.	.	1	1	1	1	.	.	.	.	1	1	.	1	.	1	4	4	1	1	1	1	1	1	.	.	1
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T8RINF	T8LSUP	T8LINF	T9RRIB	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	1	.	1	1	4	4	4	3	.	1	1	1	0	4	4	1	1	1	1	1	1	4	4	1	1	1	1	7	1	4	4	1	1	1	1	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	1	1	4	4	1	1	1	.	1	1	4	7	1	.	1	8	1	1	.	4	1	1	1	1	1	1	.	0	1	.	1	1	4	4	1	4
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	2	7	BC1	15
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	2	1	BC1	16
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	2	2	BC1	17
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.		.	6	7	1	2	BC1	18
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	2	1	BC1	19
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.		.	6	7	1	2	BC1	20
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	2	7	BC1	21
17	1	1	.	.	1	2	1	.	.	.	1	1	.	1	2	.	1	1	1	1	8	4	1	1	1	1	2	1	.		.	5	7	1	2	BC1	23
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	4	7	1	2	BC1	26

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	4	0	.	.	0	0	.	.	1	1	.	.	1	1	.	.	1	1	1	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	LRIB10TU	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP
19	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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25	.	.	.	.	.	.	.	.	.	.	.	5	.	7	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
26	.	.	.	.	.	.	.	.	.	1	.	0	.	.	.	1	1	1	1	1	0	0	1	1	1	1	4	4	1	1	1	1	5	4	1	1	1	1	4
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5BODINF	C5RSUP	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
25	4	1	7	1	1	.	.	1	2	.	.	.	.	2	1	.	.	.	.	.	.	1	7	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.
26	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T3LSUP	T3LINF	T4RRIB	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	1	1	1	1	0	0	2	1	1	1	0	.	0	0	1	.	1	.	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	1	0	0	0	0	1
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	0	0	1	.	.	.	.	.	.	.	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T8RINF	T8LSUP	T8LINF	T9RRIB	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	0	0	.	.	.	0	0	0	0
20	1	1	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	.	.	.	1	1	1	4	4	1	2	1	7	4	1	4	2	2	1	2	1	1	1	4	7	1	1	1	1	1	4	4	1	1	1	1	.	.	.	.
27	1	1	.	.	.	.	.	1	.	1	1	.	.	0	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACRBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
19	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.		.	6	7	2	1	BC1	27
20	1	1	0	1	.	1	1	1	4	4	1	1	1	1	8	4	1	.	1	1	1	7	1	.	1	.	.	.	.		.	5	7	2	2	BC1	28
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	2	7	BC1	30
22	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	4	7	2	3	BC1	31
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	2	7	2	2	BC1	32
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	2	7	2	2	BC1	33
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	2	7	2	2	BC1	34
26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	1	2	BC1	35
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	1	2	BC1	39

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	4	0	0	0	.	.	.	.	.	4	.	4	0	.	0	0	.	.	.	4	.	0	0	0	.	4	.	.	.	0	.	.	.	0	.	.	.	.	.
31	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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35	0	0	0	0	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	0	.	4	.	0	.	.	.	0	1	.	.	.	.	.	.	0	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	1	.	.	1	1	.	.	.	.	.

OBS	LRIB10TU	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RIUF	C1LSUP	C1LIUF	C2DENS	C2BODINF	C2RSUP	C2RIUF	C2LSUP	C2LIUF	C3BODSUP	C3BODINF	C3RSUP	C3RIUF	C3LSUP	C3LIUF	C4BODSUP	C4BODINF	C4RSUP	C4RIUF	C4LSUP	C4LIUF	C5BODSUP
28	.	.	.	.	.	.	.	.	.	0	1	.	0	0	0	1	.	.	.	.	0	.	1	.	1	.	.	.	0	0	.	.	.	.	0	0	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	.	.	.	.	.	.	.	.	.	0	0	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	0	.	.	.	0
35	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5BODINF	C5RSUP	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF
28	.	0	0	.	.	0	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	1	0	1	0	.	.	.	.	0	0	0	0	.	.	.	.	0	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	0	4	0	1	.	.	0	0	0	0	.	1	0	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	.	.	4	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T3LSUP	T3LINF	T4RRIB	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	0	1	.	.	.	.	0	1	0	1	.	.	.	.	0	1	0	1	.	.	.	.	0	1	1	1	.	.	.	.	0	1	0	1	.	.	.	.	0
31	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	1	.	1	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	2	4	4	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T8RINF	T8LSUP	T8LINF	T9RRIB	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	1	.	1	.	.	.	.	0	1	0	1	.	.	4	4	0	1	0	1	.	.	.	.	.	.	.	.	.	.	4	7	.	1	0	1	.	.	.	.
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	0	0	4	4	.	.	.	.	1	.	4	4	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	0	1	1	.	.	.	.	1	1	1	1	.	.	.	.

OBS	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	2	7	2	2	BC1	41
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	1	7	1	2	BC1	44
30	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	1	1	1	1	.	0	0		.	2	7	1	2	BC1	43
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	2	7	1	1	BC1	47
32	.	.	.	.	.	.	.	.	4	4	.	.	.	.	4	.	.	.	.	.	4	4	.	.	.	.	4	.	.		.	2	7	2	2	BC1	48
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	1	7	BC1	50
34	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	.	.	.	0	0	.	0	.	.	.		.	10	7	2	1	BC2	1
35	.	.	.	.	1	1	.	.	4	7	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.		.	10	7	1	2	BC2	2
36	1	.	.	.	.	.	1	.	.	.	.	1	1	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.		.	10	7	2	2	BC2	3

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD
37	0	1	.	.	0	1	0	2	.	.	.	.	1	2	.	.	1	2	1	1	1	2	1	0	4	1	.	1	0	1	0	0	1	2	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	0	0	1	0	1	1	1	1	.	1	.	1	.	1	.	1	.	2	.	1	.	1	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	.	.	.	0	0	.	.	.	0	.	.	.	0	.	.	4	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	0
45	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	1	.	.	4	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1

OBS	LRIB10TU	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
38	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	.	.	1	1	.	.	0	0	1	1	.	.	0
40	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	.	1	1	.	.	.	0	1	1	1	1	0	0	1	1	1	1	0	4	1	1	1	1	.
43	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	0	.	.	0	.	.	.	0	.	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0
45	.	.	.	5	.	.	.	.	.	1	1	.	0	0	0	1	1	1	1	1	1	1	1	.	1	1	0	0	.	.	1	1	4	4	1	1	1	1	0

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5BODINF	C5RSUP	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF
37	0	0	1	1	1	0	0	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	1	1	1	0	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
39	0	.	.	.	1	0	4	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	1	1	1	1	.	.	.	.	1	1	.	.	1	1	1	1	7	7	0	0	1	1	1	1	1	1	.	.	.	1	.	1	.	5	.	.	.	2
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	4	0	0	0	0	.	0	0	1	.	.	.	0	1	.	1	0	0	0	0	0	0
45	5	1	1	1	1	0	4	1	1	1	1	.	.	1	1	1	1	.	.	.	.	1	1	1	1	1	0	.	.	1	1	1	1	.	1	.	.	.	1

OBS	T3LSUP	T3LINF	T4RRIB	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP
37	1	.	.	.	.	.	1	.	.	.	0	0	0	0	0	.	0	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	2	.	.	.	.	1
38	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	1	1	1	1	0	0	1	1	1	1	.	1	0	0	.	1	1	1	.	.	.	.	1	1	.	1	.	1	.	.	1	1	.	1	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	0	0	.	1	.	.	.	.	0	1	0	0	.	.	1	.	1	1	.	0	.	.	.	.	0	.	0	0	0	0	.	1	0	1	.	.	.	.	0
45	1	1	.	.	.	.	1	.	1	.	.	0	.	.	1	1	1	1	.	1	.	.	1	1	1	1	0	1	0	0	.	.	.	.	.	.	.	0	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T8RINF	T8LSUP	T8LINF	T9RRIB	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF
37	1	1	1	0	.	0	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	0	0	1	1	1	.	.	.	1	0	1	.	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	.	.	.	.	.	.	.	.	4	4	1	1
45	1	1	1	.	.	.	.	1	1	1	1	1	1	0	0	1	1	1	1	4	4	.	7	1	1	1	.	.	.	.	.	.	.	.	.	4	4	1	1

OBS	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACRBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
37	.	0	.	.	.	0	1	0	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	9	7	1	2	BC2	6
38	1	1	3	3	.	1	1	1	3	3	1	.	.	.	3	3	1	.	.	.	3	3	1	8	1	8	.	1	.		.	10	7	1	3	BC2	7
39	.	.	.	.	1	1	.	.	.	.	1	7	1	7	7	7	1	2	.	.	.	.	.	.	.	.	.	.	.		.	9	7	2	2	BC2	9
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	7	7	2	2	BC2	11
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	7	7	2	7	BC2	15
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		7	2	2	BC2	15A
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	7	7	2	1	BC2	17
44	1	1	4	4	1	1	1	1	4	4	1	1	1	1	4	4	0	1	0	1	4	4	1	1	1	1	.	1	.		.	7	7	2	1	BC2	19
45	1	1	7	4	1	1	1	1	7	7	1	7	1	1	8	4	1	1	1	1	4	4	.	.	1	2	.	.	.		.	7	7	2	2	BC2	20

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	0	0	.	0	0	1	.	1	0	1	.	.	1	1	0	1	1	1	.	.	1	1	0	1	.	1	.	.	1	.	0	.	.	1	.	.	.	1	0	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	1	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	0	0	0	0	0	0	0	0	0	0	.	0	0	0	.	0	0	0	.	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	4	4	4	.	.	0	0	0	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	1	0	0	0	.	1	0	1	.	1	1	1	.	1	0	1	.	2	1	1	0	1	0	1	0	1	0	1	4	1	0	1	4	7	.	2	0	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
46	.	.	.	.	.	.	.	.	1	2	0	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	0	.	.	.	0	.	1	1	0	0	0	0	1	1	1	1	1	.	.	.	.	.	.	0	0	.	1	.	1	.	.	.	.	.	.	0	0	1
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	1	.	.	4	0	4	.	1	1	1	1	1	.	.	.	1	.	.	0	0	0	0	0	.	.	1	1	0	0	.	.	.
50	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	1	.	.	.	.	1	1	.	.	.	.	.
51	0	.	0	.	0	0	.	0	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	1	.	0	0	0	0	.	.	.	.	.	0	0	1	1	1	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	7	.	7	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	.	.	0	1	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	1	.	.	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	.	1	0	0	1	1	1	1	1	.	0	0	1	1	1	1	1
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	.	0	.	.	.	.	0	1	.	.	0	0	0	0	0	0	.	0	.
50	.	1	1	.	.	1	1	.	.	.	.	1	1	.	.	.	.	.	.	.	1	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	1	.
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	0	0	0	1	0	1	4	4	4	4	1	1	1	1	.	4	4	4	.	1	0	1	.	.	.	.	.	.	.	.	.
54	.	.	.	.	4	1	1	1	1	4	4	0	1	1	1	1	1	4	4	0	1	0	1	1	1	4	4	1	1	1	1	1	1	4	4	1	1	1	1	1

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	0	0	4	1	1	1	0	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	.	1	1	0	0	1	1	1	1	1
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	1	1	.
49	.	0	0	.	1	.	1	.	.	.	.	0	1	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1	.	0	0	0	1	0	1	.
50	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.
51	.	0	0	.	.	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	0	0	4	4	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	4	4	1	1	1	1	.
54	1	4	4	1	1	1	1	1	1	4	4	1	1	1	1	1	1	4	4	1	1	1	1	1	.	4	4	1	1	1	1	1	1	4	4	1	1	1	1	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	1	0	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	0	0	.	1	1	1	.	.	0	0	.	.	1	.	.	.	1	1	1	1	.	.	1
48	.	.	.	.	.	1	3	.	.	.	.	.	1	3	1	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	0	0	1	1	1	1	.	.	.
49	.	.	.	0	0	0	.	.	.	.	.	0	0	.	0	.	.	.	.	.	1	0	1	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	4	4	1	1	1	1	4	4	1	1	1	1	4	4	1
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	4	4	1	1	1	1	.	.	.	.	.	.	.	.	4	4	.	1	1	1	.	.	.
54	1	4	4	1	1	1	1	1	1	4	4	1	7	1	2	.	.	.	.	1	1	2	1	1	1	4	4	1	1	1	1	4	4	1	1	1	1	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	1	1		.	7	7	1	2	BC2	22
47	1	1	1	.	.	.	.	1	1	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.		.	7	7	1	1	BC2	24
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	1	2	BC2	25
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	2	2	BC2	27
50	.	1	.	.	.	.	.	1	1	.	.	.	.	1	1	.	.	.	1	.	1	.	.	.		.	6	7	2	2	bc2	28
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	0	0	0		.	5	7	2	1	BC2	29
52	1	1	1	4	4	1	1	1	1	4	4	1	1	1	1	4	4	1	1	1	.	.	.	.		.	5	7	2	1	BC2	30
53	.	.	.	4	4	1	1	1	1	7	4	1	1	1	1	4	4	1	1	.	1	4	1	1		.	4	7	1	2	BC2	31
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	6	7	1	2	BC2	32

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
55	0	1	1	0	1	1	1	1	1	1	0	1	0	1	0	2	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	1	0	7	0	2
56	0	0	0	0	0	1	.	0	0	0	.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	.	4	.
57	.	.	1	1	.	.	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	1	.	.	1	1	.	.	1	1	1	.	.	.	1	.	2	.	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	5	.	.	.
59	.	.	.	1	.	2	0	0	.	.	4	0	.	.	.	1	.	.	.	.	.	.	0	0	.	.	.	0	.	.	0	1	.	.	0	0	.	.	1	.
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	1	1	1	1	.	1	.	1	1	2	.	2	.	1	1	2	1	1	1	1	1	1	1	1	1	7	1	1	.	1	.	5	1	.	1	.	1	.
63	.	.	.	.	.	.	0	1	.	.	.	.	.	1	0	0	1	1	1	.	1	1	1	1	1	1	1	.	.	1	.	.	1	1	.	.	.	.	1	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
55	0	.	0	.	4	.	.	.	1	1	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	0	0	1	0	1	0	0	0
56	0	.	0	.	0	.	0	.	0	0	0	0	0	0	1	0	1	0	1	.	.	.	.	.	.	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	4	1	4	0	0	1	1	1	1	0	0	0	1	0	1	0	4	0	1	1	1	.	.	.
58	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	1	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	1	.	.	1	3	1	2	.	.	3	3	.	.	.	.	3
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	1	.	1	.	1	.	1	.	1	1	.	2	1	1	0	1	1	1	1	1	1	1	.	1	1	.	0	.	.	1	1	4	4	.	1	1	1	.	.	.
63	1	.	.	.	.	.	.	.	1	1	0	0	0	0	1	1	1	1	1	0	4	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
55	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	2	1	1	0	0	0	1	2	1	0
56	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
57	.	.	.	0	0	4	0	0	0	0	0	0	0	0	0	1	2	0	0	1	1	0	1	1	4	4	4	1	2	0	1	0	.	0	4	1	7	1	7	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	1	.	.	.	.	1	2	.	.	.	.	1	9	.	.	1	.	.	.	9	1	.	.	.	1	.	.	1	1	1	1	.	1	.	.	.	1	1	1	1
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	1	1	2	.	4	1	1	1	1	4	4	0	1	0	1	8	8	4	4	1	1	1	1	.	.	.	.	.	.	.	.	0	0	4	4	0	1	1	1	1
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
55	1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	0	1	1	1	1	0	0	0	0	0	1	0	1	1
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
57	0	0	0	1	1	1	1	1	.	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1	4	4	0	1	1	1	1	2	4	4	1	1	1	1	0
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	1	.	.	1	1	1	1	1	1	.	.	1	1	2	1	1	.	.	.	1	1	.	1	1	.	1	1	1	1	1	1	1	.	.	.	2	1	1	1	.
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	1	4	4	1	7	1	1	1	1	4	4	1	1	1	7	1	1	4	7	1	1	1	1	1	1	4	.	1	1	2	1	1	1	4	4	2	2	2	1	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	4	4	1	.	.	.	0	0	4	4	0	1	1	0	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP
55	1	0	0	1	1	0	1	7	7	0	0	1	1	1	1	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
57	4	4	4	4	1	1	1	4	4	0	0	1	1	1	1	1	1	7	0	1
58	.	4	.	.	1	7	1	4	.	.	.	1	1	7	1	1	1	.	.	1
59	.	.	.	2	1	1	1	1	.	.	.	1	1	1	1	1	1	.	.	1
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	.	1	1	1	1	1	1	5	5	1	2	1	2	1	1	.	5	2
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	4	4	0

OBS	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
55	1	0	1	1	1	0	0	1	1	0	1	0	0	1	1	1	1	0	0	1
56	1	1	0	0	0	0	1	4	4	1	0	0	1	1	0	1	0	0	1
57	1	1	1	1	1	7	0	1	4	1	1	0	0	1	4	1	1	4	1	1
58	1	1	1	1	1	4	4	.	7	7	.	4	4	1	1	1	1	4	4	1
59	1	1	1	.	2	3	3	1	2	1	1	.	.	2	7	2	7	.	.	1
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	1	1	1	1	1	.	.	2	.	2	.	.	.	2	8	2	8	5	7	8
63	1	0	1	1	1	4	4	1	1	1	1	7	4	1	1	.	1	4	4	1

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
55	.	1	1	.	.	1	1	1	1	.	.	.	.	1	1	0	0	.	.	1	1	0	1	1		.	5	7	2	1	BC2	33
56	4	1	.	0	0	1	.	1	4	.	.	.	.	4	.	.	.	1	1	.	.	.	.	.		.	4	7	2	1	BC2	34
57	1	1	1	7	4	1	1	1	1	8	0	1	.	1	1	7	0	1	1	1	1	0	1	1		.	4	7	1	2	BC2	35
58	1	.	1	.	.	1	7	.	1	.	.	1	1	1	1	.	.	1	.	.	.	4	.	.		.	5	7	1	2	BC2	36
59	7	1	7	.	.	8	8	8	8	.	.	9	9	9	9	0	1	9	8	9	2	7	2	2		.	7	7	1	2	BC2	40
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	7	7	2	1	BC2	41
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	5	7	1	2	BC2	42
62	9	8	9	7	8	9	9	9	9	7	7	9	9	9	9	7	7	2	.	2	2	4	3	3		.	4	7	1	2	BC2	45
63	1	1	1	.	.	.	.	.	.	7	4	1	1	1	1	4	4	1	1	1	1	7	1	1		.	4	7	2	2	BC2	46

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
64	4	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	1	1	1	.	1	.	.	.	1	.	.	4	.	.	.	4	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	0	0	0	0	1	0	1	0	1	.	.	1	0	1	1	1	1	.	.	.	1	0	1	0	1	1	1	0	1	1	1	0	1	1	1	.	.	1	1
68	.	0	0	0	.	0	0	1	.	0	1	1	0	0	.	1	0	4	0	1	.	0	.	1	0	1	1	1	1	1	.	.	.	3	0	1	.	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	0	.	.	.	1	.	1	.	1	1	4	.	.	1	1	.	1	0	1	.	.	4	1	4	1	.	4	.	1	4	1	.	.	1	.	4	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
64	1	.	1	.	4	.	1	.	1	1	4	4	0	0	2	1	1	1	1	2	0	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	0	1
65	.	.	4	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	0	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	.	1	1	1	.	1	.	0	1	0	.	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	4	0	0	1
68	.	.	0	.	0	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	0	.	0	2	0	4	0	0
69	.	.	.	.	.	.	.	.	0	1	.	.	4	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	1	0	0	0	2	1	1	1	1	1	4	1	1	1	1	4	4	1	1	0	1	4	4	1	1	0	1	5	5	1
72	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
64	0	1	0	0	0	0	1	0	1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	1
65	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	5	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	4	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	2	1	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0
68	0	0	0	4	0	2	0	2	0	0	0	0	0	0	0	0	7	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	1	1
69	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	1	.	.	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	1	1	1	4	4	.	.	0	0	4	4	.	1	0	1	8	8	4	4	0	0	0	0	.	.	4	4	0	0	0	0	.	.	.	.	1	.	.	.	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
64	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1
65	.	.	.	0	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
68	0	0	0	1	7	1	7	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	.	1	1	0	0	1	1	1	1	.	1	0	0	1	1	1	1	1
69	.	.	.	.	1	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	9	.	.	.	.	.	.	8	8	.	1	.	.	.	.	1	.	1	1	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	0	1	.	1	.	1	.	.	0	1	0	1	1	.	.	.	0	1	0	1	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	1	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
64	1	0	0	1	1	1	1	1	7	0	0	1	1	1	1	1	1	7	0	1	1	1	1	1	1	4	4	1	1	1	1	0	0	1	1	1	1	0	1	1
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	1	1	1	1	7	7	0	0	1	1	1	1	.	.	.	.	.	.	0	0	1
66	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	1
67	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1
68	.	0	0	1	1	1	1	1	1	0	0	1	1	1	1	7	.	.	8	1	2	1	1	1	1	1	0	1	8	1	1	.	.	8	8	2	8	0	0	1
69	.	.	.	5	.	1	.	.	.	.	.	5	1	.	.	.	.	.	.	1	5	1	5	.	.	.	.	.	1	.	1	.	.	.	1	1	1	.	.	1
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	0	1	0	1	4	.	.	.	1	1	1	1	.	.	1	1	1	7	.	.	1
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
64	1	1	1	8	0	1	1	1	1	7	0	1	1	1	1	1	.	1	.	1	.	.	.	.		.	3	7	1	2	BC2	47
65	1	1	1	0	4	1	1	1	1	.	.	.	.	.	.	1	4	1	1	1	1	1	1	.		.	3	7	1	2	BC2	49
66	7	1	7	.	.	.	.	1	7	.	.	1	1	.	.	.	.	1	.	.	.	.	.	.		.	3	7	1	2	BC2	49A
67	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		.	4	7	1	1	BC2	50
68	8	1	7	2	2	2	7	2	8	1	.	1	1	1	7	1	0	2	2	2	2	0	1	1		.	4	7	1	2	BC2	51
69	1	.	1	.	.	1	1	1	1	.	.	1	1	1	1	.	.	1	1	1	1	4	.	.		.	5	7	1	2	BC2	56
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	2	7	2	2	BC2	57
71	1	1	1	.	.	1	1	1	1	.	.	0	1	0	1	.	.	1	1	1	1	.	.	1		.	5	7	2	2	BC2	59
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	4	7	2	2	BC2	61

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
73	1	1	.	.	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	0	0	0	0	.	1	.	.	.	.	0	1	.	1	1	1	0	1	.	.	0	0	.	0	4	1	.	.	.	7	.	.	.	7	.	.	0	.	.	.
75	0	0	0	1	0	0	.	1	0	1	0	1	.	.	0	4	0	1	.	4	0	1	.	0	0	1	.	0	0	4	0	1	0	.	0	.	0	.	0	.
76	0	7	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	0	0	.	.	.	.	.	.	0	1	.	.	.	.	.	.	1	1	.	.	.	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	0	.	0	.
78	0	0	0	0	.	.	0	1	0	1	.	1	0	1	.	1	0	1	0	1	0	1	0	1	.	1	0	0	0	0	0	0	1	.	0	0	1	.	0	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
73	.	.	.	.	.	.	.	.	1	1	.	.	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	.	.	1	1	0	0	1	1	1	1	.	.	.
74	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75	0	.	1	.	0	.	.	.	1	1	.	.	0	1	1	1	1	1	1	1	0	1	1	1	1	0	4	1	1	1	1	0	0	0	1	0	1	0	0	0
76	.	.	.	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	0	.	0	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0	0	.	.	0	0	0	0	0
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	1	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	.	1	1	1	1	.	.	.	.	.	.	.	0	1	1	1	1	0	0	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	4	0	1	.
75	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	4	0	1	0	0	0	0	0	0	0	1	0	1	1
76	.	.	.	.	.	.	.	.	.	1	0	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	1	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.
81	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	1	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	0	0	1	0	1	0	0	.	0	0	0	4	0	0	1	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	.	0	0	0	1	1	4	4	0	0	0	0	0	0	4	4	0	0	0	0	0	0	4	4	.	1	1	1	0	0	4	4	.	1	0	1	0
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	0	.	.	.	.	0	0	.	0	.
78	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	1	.	.	.	.	0	1	.	1	.
81	0	.	.	1	1	1	1	.	.	.	.	.	.	.	.	0	0	0	0	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	4	4	1	1	1	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
74	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	1
75	0	4	4	0	1	1	1	1	1	4	0	0	1	0	1	1	1	0	4	0	1	0	.	7	7	4	0	1	1	1	1	0	0	1	.	1	1	0	0	1
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	0	0	.	.	.	.	.	.	0	0	.	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	.	0	0	0	1	0	1	0	.	.	.
78	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	1	1	1	1
80	.	.	.	.	1	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	0	.	1
81	.	.	.	.	.	.	.	1	1	0	0	1	1	1	1	.	.	0	0	1	.	.	.	1	1	0	0	0	.	0	1	0	0	.	.	.	.	0	0	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID	
73	.	.	.	.	.	1	1	.	.	7	1	1	1	1	1	8	8	1	.	1	.	.	.	.		.	4	7	1	2	BC2	65	
74	1	1	1	0	0	1	.	.	4	0	0	1	1	1	1	0	0	1	1	1	1	0	1	1		.	4	7	2	1	BC2	69	
75	1	1	1	7	4	1	1	1	1	4	4	2	1	2	1	4	4	1	2	1	2	4	1	1		.	3	7	1	2	BC2	72	
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	7	7	1	2	BC2	73	
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		.	7	7	2	1	BC2	75	
78	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	0	0		.	3	7	1	1	BC2	76	
79	9	1	9	1	1	2	8	2	9	8	1	9	9	2	9	1	4	2	8	3	2	7	1	1		.	7	7	1	2	BC2	78	
80	1	1	1	0	0	1	1	1	1	0	4	0	1	1	1	0	.	0	0	0	0	0	.	.	SIR	93	M2	7	2	2	NNT	1	2
81	.	.	.	0	0	.	.	.	.	0	0	1	.	1	1	0	0	1	.	1	.	0	1	.	SIR	93	M4	7	2	2	NNT	1	4

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
82	.	.	.	.	0	1	0	1	.	0	.	1	.	.	0	0	.	0	.	.	.	1	0	.	0	1	.	0	0	0	.	1	0	4	.	0	.	0	.	0
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	1	.	1	.	1	.	.	.	.	.	1	.	.	.	.	1	1	.	1	.	1	.	1	1	1	.	1	.	.	.	.	.	1
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	0	0	0	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	0	0	0	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	0	.	0	0	0	.	.	0	0	0	0	0	0	0	1	0	1	0	0	1	1	.	.	0	0	1	0	0	0	0	0	1
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	1	1	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.	.	.
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	.	.	.	.	.	2	1	1	1	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	1	0	0	0	0	1	1	1	1	0	0	0	1	0	1	0	0	0	0	1	1	1	1	0	0	0	.	1	.	1	.	0	0	.	1	.	1	.	1	0
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	1	.	1	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	0	1	1	1	7	1	7	.	.	0	0	0	1	1	.	.	.	.	.	1	4	1	1	0	0	0	0	0	1	1	1	.	1	0	0	.	.	0	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	1	1	1	1	.	.	4	0	.	.	.	.	4	4	.	.	0	.	.	4	1
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	1	0	.	0	0	0	0	1	7	1	7	1	1	0	0	7	.	2	7	1	1	1	0	1	1	1	1	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE		BURID
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	E1	7	1	7	NNT	1	6
83	1	1	1	7	7	.	.	.	.	7	7	1	.	.	.	7	7	.	.	.	.	0	.	0	SIR	93	M1	7	2	3	NNT	1	8
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	7	1	2	NNT	1	8A
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	2	7	NNT	1	9
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M5	7	1	7	NNT	1	10
87	4	.	.	.	.	.	1	.	1	.	.	1	1	1	1	.	.	1	2	1	1	0	.	1	SIR	93	M5	7	1	2	NNT	1	12
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	2	7	NNT	1	15
89	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	1	1	NNT	1	16
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	2	2	NNT	1	17

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	0	.	.	.	.	0	0	0	0	.	0	0	0	.	0	.	0	0	0	0	0	0	0	.	0	.	1	0	0	.	0	.	0
93	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	.	0	0	0	0	0	0	0	1	0	0	0	0	0	.	.	1	.
94	0	1	0	1	0	1	.	0	0	0	0	.	1	0	0	0	0	1	0	0	.	.	0	1	.	.	0	1	.	.	0	1	.	.	0	1	0	.	0	1
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	0	.	0	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	0	.	.	.	.	1	1	0	0	0	.	.	1	0	1	0	0	0	1	1	1	1	.	.	1	1	.	.	.	.	1	1	.	.	0	0	.
93	.	.	.	.	0	.	0	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	0	.	.	.	0	.	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	.	0	0	0	.	0	0	0	.	1	1	1	1	0	0	0
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	1	1	0	0	0	0	.	.	1	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	1	1	.	.	0	0	.
98	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	0	0	.	.	0	0	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	1	1	.	.	.	.	1	1	.	.	0	1	0	1	.	.	.	.	.	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	.	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	1
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	1	1	0	0	1	1	1	1	0	0	1	1	.	.	0	0	0	0	0	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	1	1	1	.	.	.	.	.	.	1	.	1	.	.	.	.	1	1	1	1	.	.	.	.	1	1	1	1	0	0	0	0	1	1	1	1	0
93	.	.	.	.	.	.	.	0	0	0	0	1	0	.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
94	1	0	0	2	2	1	1	.	.	0	0	.	1	0	1	1	1	0	0	1	1	1	.	1	1	0	0	0	1	0	1	.	.	.	.	.	.	.	.	.
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	0	0	1	.	.	.	.	.	0	0	.	.	.	1	0	0	0	0	0	0	0	0	.	1	0	0	.	.	1	1	.	.	.	.	.	1	.	1	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	0	.	.	.	.	0	0	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	0	0	0	1	0	1	0	1	1	0	0	1	1	1	1	1	1	0	0	1	4	1	1	1	1	0	0	0	1	0	1	0	1	1	1	1	1	1	2	.
93	0	0	0	0	0	0	0	.	.	0	0	.	.	1	1	0	1	0	0	0	0	0	0	.	.	0	0	.	.	0	.	0	0	.	.	.	.	0	0	1
94	.	.	.	.	.	.	.	.	.	0	0	0	0	0	1	1	1	0	0	1	1	1	1	.	.	.	.	.	.	.	.	0	0	1	1	.	1	0	0	1
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	1	1	.	.	0	0	1	1	1	1	.	0	.	.	.	1	0	1	1	.	0	0	.	.	.	.	0	0	1	1	1	1	0	0	.
98	.	.	.	.	0	.	0	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	.
99	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	.	.	.	.	.	.	.	.	.	0	0	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	2	2	NNT	1 18
92	1	1	1	2	0	.	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	0	0	.	SIR	93	M4	7	1	2	NNT	1 22
93	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	.	.	.	1	.	.	.	.	SIR	93	M5	7	2	1	NNT	1 23
94	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M3	7	2	2	NNT	1 24
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	7	1	7	NNT	1 25A
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M1	7	2	7	NNT	1 25B
97	.	.	.	0	0	.	0	0	.	0	0	1	1	.	1	0	0	1	1	1	1	0	.	.	SIR	93	E3	7	1	1	NNT	1 26
98	0	.	0	0	0	.	0	0	0	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	SIR	93	M2	7	2	1	NNT	1 28
99	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	0	SIR	93	M1	7	2	1	NNT	1 30

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
100	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	0	.	.	0	0	.	0	.	0	.	.	.	.	.	.	0	0	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	0	.	.	.	1	.	.	1	1	.	.	0	.	0	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	0	0	.	.	0	1	.	1	.	1	.	1	.	1	.	1	1	1	1	1	.	1	.	1	1	1	.	1	1	1	.	1	.	1	.	1	1	.	1	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
100	0	.	0	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	0	.	.	.	.	1	1	.	0	0	0	.	1	0	1	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	1	1	.	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	0	1	0	0	0	0	.	.	.	1	1	0	0	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	0	1	0	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
108	1	.	.	.	.	.	.	.	1	1	0	0	0	0	0	1	1	1	1	0	0	0	1	0	1	0	0	.	.	.	.	0	0	0	1	1	1	0	0	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP
100	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	0	0	.	.	.	0	0	0	0	.	.	.	.	0	0	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0
107	0	0	0	0	0	0	0	0	0	.	.	0	1	0	1	0	0	0	0	0
108	1	1	1	0	0	1	1	4	1	.	.	0	1	0	1	0	0	0	0	2

OBS	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
100	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	1	.	1	0	0	0	0	.	1	.	1	0	0	0	0	0	0	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	0	0	0	4	.	.	.	.	.	.	.	.	.	.	.	.	.
104	.	0	0	.	.	.	.	1	1	0	0	.	.	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	1	0	1	.	.	0	0	0	0	0	0	0	0	0	0	0	1	1	1	.
108	1	1	1	.	0	0	4	2	1	2	1	0	0	0	1	0	1	1	1	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	1	1	1	1	.	.	.	.	0	1	0	1	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	.	.	.	.	1	.	1	.	.	.	.	1	1	1	1	.	.	.	.	.
106	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	0	1	0	1	.	.	.	.	0	.	.	.	.	.	.	.	.
108	.	1	.	0	1	1	1	0	0	1	0	1	1	1	1	0	0	0	1	0

OBS	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	0	0	0	.	.	.	.	1	1	1	4	0	0	0	0	0	.	0	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	1	.	1	.	.	.	.	0	.	.	.	.	.	0	0	0	0	0	0	0
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	1	1	1	.	.	.	.	1	1	1	1	0	0	0	0	0	1	.	1	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
100	0	0	0	0	0	1	.	.	.	0	0	0	0	0	0	0	0	0	0	.	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
101	.	.	0	.	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	.	0
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.	.	0	0	1	.	1	.	1	0	1
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
105	0	0	0	0	1	.	.	.	.	0	0	0	1	.	1	.	.	0	0	1	0	1	0	.	.	.	.	1	.	1	.	0	0	1	.	.	.	.	0	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	4	.	.	0	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	0	0	0	.	.	.	.	1	0	0	.	0	1	0	0	0	0	0	1	0	1	.	.	0	0	0	1	0	1	0	0	1	1	1	1	0	0	1

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE		BURID
100	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	.	0	1	SIR	93	M5	7	2	1	NNT	1	31
101	0	.	0	.	.	.	0	0	0	.	.	.	0	1	0	.	.	0	0	0	0	.	.	.	SIR	93	M5	7	1	2	NNT	1	34
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M3	7	1	7	NNT	1	38
103	1	.	1	4	0	1	.	1	1	0	0	1	1	1	.	0	0	.	.	1	3	0	1	.	SIR	93	M8	7	2	3	NNT	1	40
104	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M8	7	2	2	NNT	1	41
105	1	1	.	0	0	1	1	1	1	0	0	1	1	1	1	0	0	1	0	1	0	4	.	.	SIR	93	M7	7	2	2	NNT	1	43
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	SIR	93	M7	7	2	2	NNT	1	44
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M8	7	2	2	NNT	1	47
108	1	.	1	1	0	1	1	1	1	0	0	1	1	1	1	4	7	.	.	.	.	5	1	1	SIR	93	M4	7	1	2	NNT	1	48

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
109	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	0	1	1	1	.	1	1	1	.	1	0	1	.	1	0	1	.	1	0	1	.	.	0	1	.	.	0	1	.	.	.	1	.	.	0	.	.	.	1	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117	.	.	.	.	0	1	.	1	.	.	.	1	.	0	.	.	.	1	.	0	0	0	.	.	.	0	0	1	.	0	.	.	0	.	.	.	.	.	0	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
109	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	1	0	1	0	1	0	1	.	1	.	0	0	.	1	1	1	0	0	1	1	1	1	0	0	0
115	.	.	.	.	.	.	.	.	1	.	0	0	.	.	2	.	.	1	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	.	.	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117	.	.	0	.	.	.	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	0	1	0	0	0

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
109	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	1	0	1	0	0	0	1	.	.	0	0	0	0	0	1	0	0	0	0	0	1	0	.	0	0	0	0	1	1	1	1	.	.	0	0	.	.	.	0	0
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117	1	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	.	0	0	0	0	0	0	0	0	0	0

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
109	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	0	0	0	1	.	1	.	0	0	0	0	0	1	0	.	0	0	0	0	.	1	0	1	0	0	0	0	0	1	.	1	0	0	0	0	1	1	1	1	0
115	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
117	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	.	.	0	.	0	0	0	0	0	0	0	0	0

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
109	.	.	.	.	.	.	.	0	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1	1	1	8	0	.
114	0	0	0	1	1	1	1	0	0	0	0	1	1	0	1	.	0	0	0	1	0	.	1	1	0	1	0	0	1	.	1	.	.	1	1	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	0	1	0	.	0	.	.	.	0	4	0	.	.	.	.	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	.	1	.	1	.	.	.	.	.	.	.	.	.
117	0	0	0	.	0	0	0	0	0	0	0	.	.	.	.	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	1	1	1	1	0	0	1

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE		BURID
109	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	SIR	93	M8	7	2	3	NNT	1	49
110	0	.	.	0	0	1	1	1	.	0	0	1	1	1	.	0	0	1	.	.	.	0	1	.	SIR	93	M4	7	1	2	NNT	1	50
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M8	7	1	7	NNT	1	51
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M3	7	2	7	NNT	1	53
113	1	.	1	.	.	.	.	.	.	0	0	1	1	1	1	0	0	1	.	1	1	0	1	.	SIR	93	M2	7	2	3	NNT	1	54
114	1	.	1	.	.	.	.	1	.	0	0	.	.	.	1	0	0	1	1	.	.	.	1	.	SIR	93	M3	7	1	2	NNT	1	55
115	.	.	.	4	4	.	.	.	.	4	4	.	.	.	.	4	4	.	.	1	.	4	.	.	SIR	93	M2	7	2	2	NNT	1	59
116	.	.	.	7	8	1	1	1	1	.	8	.	.	1	.	8	8	.	.	1	.	7	1	1	SIR	93	M2	7	2	3	NNT	1	62
117	1	1	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	.	0	SIR	93	M3	7	2	1	NNT	1	63

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
118	.	.	.	0	.	.	.	.	.	.	.	1	.	.	.	.	0	1	0	1	.	1	0	0	0	.	.	0	0	1	.	1	0	1	.	.	0	1	.	.
119	.	.	.	.	.	.	0	.	0	0	0	0	.	.	.	.	.	0	.	0	.	.	.	.	0	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	0	.	.	0	1	0	0	.	.	0	0	.	0	0	1	0	0	0	0	0	0	.	0	.	.	.	0	.	.	0	.	0	0	0	0	0	0	0	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
118	.	.	.	.	.	.	.	.	1	.	.	0	1	0	0	.	.	1	1	0	1	0	1	0	.	0	4	0	0	.	.	4	0	.	.	.	.	0	9	0
119	.	.	.	.	.	.	.	.	1	1	0	0	0	0	0	1	0	1	0	0	0	1	.	1	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	.
120	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	0	.	0	.	0	.	.	.	0	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	0	1	.	.	0	0	.	.	1	.	.	.	.
124	.	.	.	.	.	.	.	.	1	.	0	0	0	0	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
118	1	.	.	8	0	1	1	.	.	4	0	.	.	0	1	.	.	.	.	0	1	0	1	.	.	.	.	0	1	.	.	0	0	1	1	1	1	1	1	.
119	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	0	.	.	.	0	0	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	0	0	.	.	.	.	.	.	4	0	.	.	.	.	.	.	.	.	2	1	0	1	.	.	.	.	1	1	1	1	.	.	.	.	1	1	1	1	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
118	.	.	1	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1	1	.	.	0	0	1	0	1	.	1	.	0	0	1	0	1	.	.
119	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	.	.	.	.	0	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	0	0	.	.	.	.	0	0	0	0	1	0	1	0	0	0	0	0	1	1	1	1	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	1	.	1	0	0	.	0	1	1	1	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	1	.	1	0
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
118	1	0	.	0	.	0	.	2	1	0	0	.	.	.	.	0	0	0	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	0	0	.	0	.	0	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	0	0	.	0	.	.	0	0	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	.	1	0	1	0	0	.	0	0	0	0	0	0
121	.	.	.	.	.	.	.	0	0	0	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	0	4	4	.	.	.	.	0	0	4	4	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	1	.	1	.	.	.	1	.	.	.	.	1
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	1	3	NNT	1 65
119	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.	.	.	SIR	93	M2	7	1	1	NNT	1 67
120	1	.	1	0	0	1	.	.	.	0	0	.	.	0	0	.	.	.	.	0	.	.	.	0	SIR	93	M3	7	1	2	NNT	1 72
121	0	.	0	.	.	.	.	.	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	SIR	93	M2	7	1	2	NNT	1 77
122	.	.	.	.	.	1	1	1	1	.	.	.	2	.	.	0	.	.	.	0	.	.	.	.	SIR	93	M4	7	1	2	NNT	1 78
123	1	.	.	.	.	.	2	.	.	7	9	.	.	1	.	9	9	.	.	.	.	5	.	.	SIR	93	E3	7	1	3	NNT	1 81
124	.	.	.	.	.	.	.	.	1	.	.	.	.	1	1	.	1	.	1	.	.	1	1	.	SIR	93	M1	7	1	3	NNT	1 88
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	SIR	93	M4	7	1	7	NNT	1 90
126	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IR	3		7	1	7	NNT	1 C

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	0	.	0	.	.	.	.	.	.	.	.	.	.	0	0	0	1	.	.	.	.	0	0	.	1	.	.	0	0	.	.	.	.	.	.	.	.	.	.
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	0	0	.	.	0	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	0	.	0	0	0	0	1	0	0	0	0	0	0	0	1	.	.	0	.	.	.
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
127	.	.	.	.	.	.	0	.	.	.	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	.	.	.	.	1	1	0	.	0	.	1	1	1	0	1	0	0	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	1	1	.	0	0	0	0	.	.	0	0	0	0	0	0	5	0	0	0	.	0	0	0	4	0	0	0	0	0	4	0	0
132	0	.	0	.	.	.	.	.	1	1	0	0	0	0	.	.	.	.	.	0	0	0	1	0	1	.	0	0	.	0	.	0	.	0	.	0	.	0	0	.
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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135	.	.	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	0	0	.	0	.	.	0	1	0	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	1	0	1	.
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	1	0	1	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	.	1	.	0	.	.	0	0	0	1	.	1	.
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	.	1	1	0	0	0	0	1	1	.	.	0	0	0	0	.	1	.	1	.	.	.	0	.	.	.	.	.	.	0	0	1	1	1	.	.
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	0	0	0	1	.	1	.	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	.	0	0	0	0	0	1	.	.	0	0	0	1	0	1	0
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
127	.	.	.	.	.	.	.	.	.	.	.	0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	.	.	0
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	1	.	1	1	1	0	.	1	1	1	1	.	.	.	0	1	1	1	1	.	.	.	.	.	1	1	1	0	0	1	1	1	1	1	0	1
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	.	0	.	0	0	0	0	0	1	0	1	0	0	1	1	0	1	0	0	1
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE		BURID
127	0	.	0	.	.	0	.	.	.	.	.	.	.	.	1	.	.	0	1	.	.	.	.	.	SIR	93	M6	7	1	3	NNT	2	1
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	1	2	NNT	2	3
129	1	.	1	1	0	1	1	.	1	1	0	1	1	1	1	1	0	.	.	.	.	.	1	1	NLV	94	E1	7	2	2	NNT	2	4
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	1	2	NNT	2	7
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	1	2	NNT	2	9
132	0	1	0	0	4	0	0	0	0	5	0	1	0	1	.	0	0	.	0	.	0	0	0	0	NLV	94	E3	7	1	1	NNT	2	10
133	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	2	7	NNT	2	11
134	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M5	7	2	7	NNT	2	17
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	2	1	NNT	2	20

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	0	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	0	0	4	0	.	0	0	.	0	0	0	.	.	.	0	.	.	.	0	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	0	1	.	.	.	0	.	0	.	.	0	0	.	1	.	2	0	0	.	1	.	2	.	1	.	1	0	1	.	1	.	1	.	1	1	1	1	.
141	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	0	0	0	0	.	.	0	0	.	0	.	.	0	0	.	.	0	0	0	0	0	0	0	0	.	0	.	0	0	0	0	0	.	.	0	0	.	.	.	.
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0
138	.	.	.	.	.	.	.	.	0	0	0	.	0	0	0	.	.	1	1	0	0	0	0	0	0	.	.	.	.	0	0	.	.	.	.	0	0	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	0	.	.	.	0	.	.	.	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	0	0	0	0	.
141	.	.	.	.	.	.	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	0	.	.	.	.	.	.	0	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	0	0	0	0	0	0	0	.	.	0	0	.	.	0	0	0	0	4	4	0	.	0	.	.	.	4	0	0	0	.	0	.	.	0	0	.	.	.	.	.
138	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	0	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	0	0	0	0	0	0	.	0	1	0	0	.	0	0	0	0	.	.	0	.	0
141	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	0	0	0	0	0	0	0	0	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	4	4	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.	0	4	4	.	.	.	.	0
138	.	.	.	.	.	.	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	.	0
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	0	0	.	.	.	.	1	1	1	4	0	0	0	0	.	.	.	.	.	.	.	.	1	1	1	1	1	0	1	0	1	1	0	0	.	1	0	0	1
141	.	4	4	.	.	0	.	.	.	4	4	.	.	.	.	.	.	4	4	0	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	.	.	.	.	.	.	0	0	0	0	.	.	0
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	0	4	4	.	.	.	.	.	.	4	4	.	.	.	.	.	.	4	4	.	.	.	.	.	.	4	4	.	0	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	0	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	0	0	0	0	.	0	1	1	.	1	.	0	0	0	1	.	.	1	0	.	.	.	1	1	1	0	0	0	0	1	0	0	1	1	1	2	0	0	1
141	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	.	1
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0	0	0	0	.	.	.
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
136	.	.	.	.	0	1	0	1	.	4	4	1	1	.	.	8	7	1	1	1	.	.	.	.	NLV	94	M5	7	2	2	NNT	2 21
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M5	7	2	2	NNT	2 22
138	.	.	.	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M5	7	1	2	NNT	2 23
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	1	2	NNT	2 24
140	1	1	1	0	1	1	1	1	1	4	0	1	2	1	2	4	0	1	1	1	1	0	1	.	NLV	94	M6	7	1	2	NNT	2 26
141	1	1	1	.	.	.	.	1	1	.	8	.	.	.	.	8	8	.	.	.	.	8	1	.	NLV	94	M6	7	1	3	NNT	2 27
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	2	7	NNT	2 31
143	.	.	0	.	.	.	1	.	0	0	0	0	0	.	.	0	0	.	.	.	.	0	.	.	NLV	94	M4	7	1	1	NNT	2 32
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	2	7	NNT	2 37

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	0	0	.	.	.	0	.	.	.	1	.	.	.	.	1	1	.	.	1	1
147	.	.	.	.	.	.	.	.	.	.	0	1	.	1	.	1	.	.	.	.
148	.	0	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.
149	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	0	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	0	1	.	.	0	1	1	1	0	1	1	1	.	1	.	1	1	1
152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
153	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0

OBS	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	1	1	1	0	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
147	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
149	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	1	1	.	1	1	1	.	1	1	1	.	.	1	1	1	.	.	.	1	.
152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
153	0	1	.	0	.	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	1	.	0	0	0	0	1	1	1	1	0
147	.	.	.	.	.	.	.	.	.	.	0	0	.	0	2	1	1	1	1	1
148	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	1	1	1	1	1
149	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	.	0	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	1	.	.	.	.	1	.	1	1	0	0	0	0	2	1	1	1	1	1
152	.	.	.	.	.	.	.	.	1	1	.	.	0	0	.	.	.	.	.	.
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.

OBS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	0	0	0	0	0	0	0	0	0	.	.	0	1	0	.	.	.	1	1	0
147	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
148	0	1	.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
149	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	1	1	1	1	1	1	1	0	1	0	1	4	7	0	1	0	1	.	.	.
152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	0	0	0	1	2	.	.	.	.	4	0	0	0	0	0	.	0	.	4	.	.	1	.	.	.	.	.	1	0	0	0	.	.	0	1	.	.	.	1	1
147	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	1	1	0	0	1	0	1	0	.	1	0	0	0	1	0	0	0	.	0	0	2	0	0	0	0
148	0	0	0	.	.	.	1	0	1	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	0	0	0	.	.	.	.	.	.	0	.	.	.	.	.
149	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	1	1	1	1	.	1	0	1	2	8	.	0	0	0	1	1	.	.	1	1	1	1	1	1	4	4	1	1	1	1	1	1	4	4	1	1	1	1	1
152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
153	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	.	0	0	1	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	1	1	1	0	0	.	.	1	1	7	4	.	.	1	0	1	1	0	0	.	.	0	0	.	.	.	.	0	0	0	0	.	.	.	.	.	0	.	0	.
147	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	0	0	.	.	1	.	0	0	0	0	0	0	0	0	0	0	0	1	0	1	.
148	.	0	1	.	1	.	.	.	.	1	1	.	1	.	.	.	.	1	1	.	.	1	.	.	.	.	.	.	1	1	1	.	.	1	1	1	2	1	8	.
149	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	4	7	1	1	.	1	1	1	1	7	1	1	1	1	.	.	7	7	1	1	1	1	1	1	.	4	.	.	.	.	1	1	4	4	.	.	.	.	1
152	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	1	.	.	.	.	0	0	1	1	1	1	.	.	0	0	.	.	.	.	.
153	.	.	.	.	.	.	.	.	0	1	0	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	0

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9B0DSUP	T9B0DINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSU	T10BODIN	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSU	T11BODIN	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSU	T12BODIN	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	0	1	1	1	.	.	.	.	.	.	1	.	.	.	.	.	1	1	.	1	.	.	.	.	0	.	.	.	.	.	.	1	.	1	.	.	1
147	.	0	0	0	0	.	.	1	1	0	0	3	1	.	2	1	0	1	1	1	0	1	0	1	1	4	0	1	1	1	1	0	0	1	1	1	1	0	0	1
148	.	7	7	2	1	2	1	.	.	7	7	.	1	.	1	.	.	7	7	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	8	.
149	.	0	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	1	4	4	1	1	1	1	1	1	4	4	1	1	1	1	7	7	4	4	1	7	1	8	1	1	4	4	.	1	8	1	7	7	1	1	1	1	7	7	.
152	.	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
153	.	.	0	.	1	.	1	.	.	1	1	1	.	1	.	.	.	0	0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE		BURID
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	1	7	NNT	2	38
146	1	1	1	.	.	.	.	1	.	.	.	.	.	1	.	.	.	1	1	.	.	.	.	1	NLV	94	M4	7	2	3	NNT	2	39
147	1	1	.	0	0	1	1	1	.	0	0	1	1	1	.	1	1	1	1	1	1	0	1	1	NLV	94	M1	7	1	2	NNT	2	41
148	.	1	1	7	8	.	1	.	7	8	8	.	1	.	.	.	.	1	1	.	.	7	1	.	NLV	94	E2	7	1	3	NNT	2	42
149	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	2	2	NNT	2	43
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	1	.	NLV	94	E1	7	2	7	NNT	2	45
151	1	.	1	7	7	.	2	1	2	.	.	2	8	2	2	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	1	2	NNT	2	47
152	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	2	2	NNT	2	48
153	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M5	7	1	3	NNT	2	49

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
156	0	0	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	0	0	0	0	0	0	.	0	.	0	0	0	0	0	0	0	0	0	.	.	.	0
157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
158	.	1	.	.	.	.	.	.	.	1	.	.	.	1	.	1	.	1	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.
160	.	0	.	.	.	.	.	.	.	0	.	.	0	0	0	0	0	0	0	0	.	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	RBOCCIP	LBOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RSINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RSINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RSINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RSINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
154	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	.	.	.	.	.	.	.	.	1	1	0	0	.	0	0	1	1	1	1	0	0	1	0	1	.	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0
156	.	.	.	0	0	.	.	0	1	1	0	0	.	0	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	.	.	.	.	0	0	.	.	.	.	.
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0	0	.
159	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	0	1	.	.	.	0	1	0	1	0	0	0	.	.	.	.	0	0	.	.	0	0	.	.	.
160	0	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	.	.	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	.	.	.	.	.	.	.	.	1	.	.	0	0	0	.	1	1	.	.	0	7	1	0	1	0	4	4	.	.	.	.	4	7	1	.	.	.	.	.	1
162	.	.	.	.	.	.	.	.	1	1	0	0	0	0	1	.	1	.	1	1	0	1	0	1	.	0	.	0	0	.	.	.	0	.	.	0	0	.	.	0

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
154	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	0	0	0	0	0	0	.	0	.	0	0	0	1	0	1	1	0	0	0	0	1	0	0	.	.	0	0	.	.	.	.	.	.	0	0	0	0	0	0	.
156	0	0	0	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0
157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
158	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	.	0	.	.	.	.
159	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0
160	0	0	0	0	0	0	0	0	0	.	.	1	0	.	.	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	.	0	.	.	0	0	.	0	0
161	0	.	.	4	4	.	.	1	0	.	.	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.
162	0	.	.	.	.	0	0	.	.	0	1	1	1	.	.	.	0	1	1	0	0	1	1	.	.	.	.	0	0	.	.	.	.	4	0	.	0	.	0	1

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	.
155	0	0	0	.	0	.	0	0	.	0	0	.	0	.	0	0	.	0	0	0	0	.	0	0	0	0	0	.	0	.	0	.	.	0	0	0	0	0	0	.
156	0	.	.	0	0	0	0	0	0	.	.	0	0	0	0	.	.	.	.	.	0	.	0	0	0	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0
157	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
158	.	.	.	.	0	.	0	.	.	.	.	.	0	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.
159	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	0	.	.	.	.	.	0	0	.	.	0	.	0	.	0	0	0	.	0	.	.
160	.	.	.	0	0	0	0	0	.	.	.	0	0	0	0	.	.	.	.	.	0	.	0	.	.	.	.	0	0	.	0	.	0	.	.	0	0	0	0	0
161	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	1	0	0	0	.	0	.	1	1	0	0	0	.	0	.	1	1	0	0	.	.	0	0	1	1	4	0	0	0	0	0	1	1	0	0	1	0	1	0	1

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9B0DSUP	T9B0DINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10B0DSUP	T10B0DINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11B0DSUP	T11B0DINF	T11RSUP	T11RINF
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.
155	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
156	0	0	0	0	0	0	0	.	0	0	0	0	0	.	.	0	0	0	0	0	0
157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
158	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	0	0	.	.	.	.	0	0	0	0	0	0	0	.	1	0	0	0	0	0
160	0	0	0	1	1	0	1	.	.	0	0	4	.	1	1	.	.	0	0	0	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	1	0	0	.	0	.	0	1	1	0	1	.	.	.	.	.	.	.	.	.	.

OBS	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12B0DSUP	T12B0DINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1B0DSUP	L1B0DINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2B0DSUP	L2B0DINF	L2RSUP
154	1	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.
155	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
156	.	0	.	.	0	0	.	0	.	0	0	0	0	0	0	0	0	0	0
157	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.
158	.	.	.	.	.	.	0	1	0	1	.	.	.	1	0	1	.	.	1
159	0	0	1	1	0	0	0	.	0	0	0	0	0	0	0	0	0	0	1
160	0	.	.	.	0	0	1	1	1	1	0	0	.	1	.	.	.	.	.
161	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	1
162	.	.	1	1	.	.	0	0	.	1	1	1	0	0	1	1	1	1	4

OBS	L2RINF	L2LSUP	L2LINF	L3B0DSUP	L3B0DINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4B0DSUP	L4B0DINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5B0DSUP	L5B0DINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE	BURID
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E3	7	2	3	NNT 2	52
155	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	1	2	NNT 2	55
156	0	0	0	0	0	1	0	1	.	0	0	0	.	0	.	0	0	0	0	0	0	0	0	0	NLV	94	M6	7	1	1	NNT 2	56
157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	2	7	NNT 2	57
158	.	.	.	4	4	1	1	.	1	4	4	1	1	1	1	7	.	1	.	1	.	4	1	1	NLV	94	M6	7	2	2	NNT 2	58
159	1	1	1	.	0	.	.	.	1	0	0	1	1	1	1	1	0	1	1	1	1	0	1	.	NLV	94	M5	7	2	1	NNT 2	59
160	1	.	1	4	4	.	1	0	.	.	.	.	.	1	.	0	0	.	1	.	.	.	.	.	NLV	94	M6	7	2	1	NNT 2	60
161	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	NLV	94	M6	7	1	3	NNT 2	61
162	0	2	1	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	NLV	94	E1	7	1	2	NNT 2	62

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
163	0	0	1	0	.	1	.	1	.	.	1	1	.	1	1	0	0	0	.	1	0	1	.	1	1	1	.	.	0	.	.	.	0	0	.	.	1	.	0	.
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	0	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.	0
168	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	0	0	.	0	.	1	0	.	.	1	.	.	.	1	.	.	.	.	0	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
163	.	.	0	.	.	.	.	.	1	0	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	1	0	0	0	0	0
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	1	0	0	0	1	1	0	1	0	.	.	1	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.
168	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
169	.	.	.	.	.	.	.	.	1	.	.	0	0	.	.	1	0	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
163	0	.	.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	.	.	0	0	.	0	.	0	0
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	0	0	0	0	0	0	0	0	0	.	.	0	0	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0	0	.	.	.	.	0	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	0	0	0	0	0	0	.	.	.	.	0	0	.	0	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	.	.	.	0	0	0	1	0	0	.	.	.	.	.	.	.	.	.
169	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	0	0	.	.	.	0	0	.	0	.	0	.	.	0	0	.	0	.	0	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
163	0	0	0	0	0	0	0	0	.	0	0	.	0	1	0	.	.	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
164	.	.	.	.	.	2	0	.	.	.	.	.	.	.	.	.	.	.	.	0	.	0	1	.	.	.	.	0	0	0	0	.	.	.	.	0	0	0	0	.
165	.	.	.	0	0	.	0	.	.	0	0	.	.	0	.	.	.	0	0	.	.	.	0	.	.	.	.	0	0	0	0	.	.	.	.	0	.	0	0	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	.	.	0	0	.
169	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	.	0	0	.	0	.	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
163	0	4	4	0	0	0	0	0	0	4	4	0	1	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	1	1	0	0	1	1	1	.	4	4	.
164	.	.	.	0	0	.	0	.	.	.	.	1	1	1	.	.	.	.	.	1	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	0	0	.	.	.	.	.	.	.	.	1	0	.	0	.	.	.	.	0	.	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	0	.	.	.	1	1	0	1	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YEAR	PHASE	CARD7	SEX	AGE	SITE	BURID
163	1	.	1	1	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	.	0	1	1	NLV	94	M1	7	1	2	NNT 2	64
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	1	2	NNT 2	67
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	2	2	NNT 2	68
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	2	7	NNT 2	69
167	1	.	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M6	7	1	3	NNT 2	70
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	2	2	NNT 2	71A
169	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	1	2	NNT 2	71B
170	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	1	7	NNT 2	73
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	2	1	NNT 2	75

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
172	.	1	.	0	.	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	1	0	0	.	1	.	.	.	.	.	.	.	.	0	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	0	0	.	.	.	0	.	.	0	0	.	0	.	.	0	0	.	.	.	0	.	0	0	0	0	0	0	0	.	0	0	0	0	0	.	.	0	0	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
179	.	.	.	.	.	.	.	.	1	1	.	1	1	2	1	1	.	1	1	1	.	1	1	2	1	1	.	1	1	1	.	1	1	2	1	1	1	.	1	.
180	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	ROCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	0	.	.	0	.	.	.	1	1	0	0	0	0	.	1	0	1	0	0	.	0	.	0	.	.	0	.	0	.	0	0	.	0	.	0	.	.	.	.
175	.	.	.	.	.	.	.	.	0	0	.	0	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.
176	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
179	.	.	1	.	.	.	.	.	1	1	0	0	0	0	1	1	1	1	1	1	.	1	.	1	.	.	1	.	1	.	1	0	7	.	.	.	.	2	0	.
180	.	.	.	.	.	.	.	.	1	1	0	.	0	0	.	1	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	.	.	.	0	.	0	.	0	0	.	0	.	0	.	0	0	.	0	.	0	.	0	.	.	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0
175	0	.	.	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	0	.	.	.	.	.	.	.	0	0	.	0	.	.	0	.	.	.	0	.	.
176	0	.	.	1	2	0	1	0	1	.	.	.	.	.	.	.	.	.	.	1	1	.	.	1	.	.	.	2	1	.	.	.	.	.	1	1	1	.	.	.
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
179	.	1	1	1	0	.	.	0	1	1	1	1	1	.	1	1	0	0	0	1	1	.	.	1	1	0	0	1	1	1	1	1	0	0	0	1	.	1	.	1
180	0	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4	0	0	.	.	0	.	.	.	.	.	.	.	.	.	.

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
172	.	0	1	0	0	.	0	.	.	0	0	.	0	.	.	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	0	0	0	0	.	0	0	.	0	0	0	0	.	0	0	0	0	0	0	0	0	0	.	.	0	0	.	0	0	0	.	.	0	0	.	.	0	0	.
175	.	.	0	.	.	.	.	.	.	0	0	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	1	0	4	.	.	.	.	1	1	0	0	.	1	.	1	1	1	0	0	.	1	.	1	1
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
179	1	0	0	.	1	.	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	.	1	1	0	0	1	1	.	1	7	1	0	0	1	1	1	1	7
180	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

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VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	0	0	0	0	.	.	.	.	0	0	0	0	.	.	.	.	0	0	.	.	0	.	.	.	.
176	1	4	4	1	1	1	1	.	.	0	0	1	1	.	1	1	.	0	0	1	.	.	.	.	.	.	.	.	1	.	1	0	4	.	1	1	1	2	1	.
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
179	1	0	0	1	1	1	1	2	2	0	0	1	2	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	0	.	1	.	1	.	.	.	1	.	.	.	.	.

OBS	L2RINF	L2LSUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX	AGE	SITE		BURID
172	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	1	2	NNT	2	76
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E2	7	2	2	NNT	2	78
174	.	0	.	0	0	.	0	.	0	.	.	0	0	0	.	0	0	0	0	0	0	0	0	0	NLV	94	E3	7	2	1	NNT	2	79
175	.	1	0	0	0	.	.	0	.	.	.	.	0	.	0	0	0	.	1	1	.	0	1	1	NLV	94	E1	7	2	1	NNT	2	83
176	.	1	1	1	4	1	.	.	1	.	.	2	1	1	.	1	.	.	1	.	1	.	0	1	NLV	94	M4	7	1	2	NNT	2	85
177	.	.	.	.	.	1	1	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	2	7	NNT	2	86
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E2	7	2	2	NNT	2	88
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E2	7	1	3	NNT	2	89
180	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E3	7	1	3	NNT	2	90

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB1HD	RRIB1TUB	LRIB1HD	LRIB1TUB	RRIB2HD	RRIB2TUB	LRIB2HD	LRIB2TUB	RRIB3HD	RRIB3TUB	LRIB3HD	LRIB3TUB	RRIB4HD	RRIB4TUB	LRIB4HD	LRIB4TUB	RRIB5HD	RRIB5TUB	LRIB5HD	LRIB5TUB
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	0	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0	.
183	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	1	1	1	.	.
184	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
185	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
186	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	0	.	0	.	.	.	.	.	0	.	0	.	0	.	.	.	0	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB6HD	RRIB6TUB	LRIB6HD	LRIB6TUB	RRIB7HD	RRIB7TUB	LRIB7HD	LRIB7TUB	RRIB8HD	RRIB8TUB	LRIB8HD	LRIB8TUB	RRIB9HD	RRIB9TUB	LRIB9HD	LRIB9TUB	RRIB10HD	RRIB10TU	LRIB10HD	LRIB10TU
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
183	.	1	.	1	1	1	.	.	.	1	.	.	.	.	.	.	.	.	1	.
184	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
185	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
186	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	RRIB11HD	RRIB11TU	LRIB11HD	LRIB11TU	RRIB12HD	RRIB12TU	LRIB12HD	LRIB12TU	RBOCCIP	LOCCIP	RMANDCON	LMANDCON	RMANDFOS	LMANDFOS	C1DENS	C1RSUP	C1RINF	C1LSUP	C1LINF	C2DENS	C2BODINF	C2RSUP	C2RINF	C2LSUP	C2LINF	C3BODSUP	C3BODINF	C3RSUP	C3RINF	C3LSUP	C3LINF	C4BODSUP	C4BODINF	C4RSUP	C4RINF	C4LSUP	C4LINF	C5BODSUP	C5BODINF	C5RSUP
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
183	.	.	1	.	.	.	.	.	.	1	0	0	0	0	.	1	1	1	1	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.
184	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
185	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	1	0	0	0	.	0	0	0	0	.	0	0	0	0	1	.	.	.	.	.	.	.
186	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.	0	.	0	0	0	0	0	0	.	0	0
187	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	.	.	.	.	.	.	.	.	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	C5RINF	C5LSUP	C5LINF	C6BODSUP	C6BODINF	C6RSUP	C6RINF	C6LSUP	C6LINF	C7BODSUP	C7BODINF	C7RSUP	C7RINF	C7LSUP	C7LINF	T1RRIB	T1LRIB	T1BODSUP	T1BODINF	T1RSUP	T1RINF	T1LSUP	T1LINF	T2RRIB	T2LRIB	T2BODSUP	T2BODINF	T2RSUP	T2RINF	T2LSUP	T2LINF	T3RRIB	T3LRIB	T3BODSUP	T3BODINF	T3RSUP	T3RINF	T3LSUP	T3LINF	T4RRIB
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
183	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	0	0	.	.	.	.	.	.	0	0	.	.	.	.	.
184	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
185	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	0	.	.	.	.	.	.
186	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	.	.	0	0	.	.	.	4	0	.	.	.	.	.	7	4	.	.	.	.	.
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T4LRIB	T4BODSUP	T4BODINF	T4RSUP	T4RINF	T4LSUP	T4LINF	T5RRIB	T5LRIB	T5BODSUP	T5BODINF	T5RSUP	T5RINF	T5LSUP	T5LINF	T6RRIB	T6LRIB	T6BODSUP	T6BODINF	T6RSUP
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
183	.	0	0	.	.	.	.	0	0	1	0	0	.	0	0	0	0	1	1	.
184	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.
185	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0
186	.	0	4	.	.	.	.	.	0	.	.	0	1	0	1	.	.	.	.	.
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	.	.	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	T6RINF	T6LSUP	T6LINF	T7RRIB	T7LRIB	T7BODSUP	T7BODINF	T7RSUP	T7RINF	T7LSUP	T7LINF	T8RRIB	T8LRIB	T8BODSUP	T8BODINF	T8RSUP	T8RINF	T8LSUP	T8LINF	T9RRIB
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
183	1	0	1	.	0	4	7	.	1	.	1	.	0	1	1	1	.	1	.	1
184	0	.	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	0	.
185	0	0	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.
186	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	0
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	T9LRIB	T9BODSUP	T9BODINF	T9RSUP	T9RINF	T9LSUP	T9LINF	T10RRIB	T10LRIB	T10BODSUP	T10BODINF	T10RSUP	T10RINF	T10LSUP	T10LINF	T11RRIB	T11LRIB	T11BODSUP	T11BODINF	T11RSUP	T11RINF	T11LSUP	T11LINF	T12RRIB	T12LRIB	T12BODSUP	T12BODINF	T12RSUP	T12RINF	T12LSUP	T12LINF	L1BODSUP	L1BODINF	L1RSUP	L1RINF	L1LSUP	L1LINF	L2BODSUP	L2BODINF	L2RSUP
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
183	1	1	1	0	1	0	1	1	1	7	7	0	1	0	1	1	1	7	4	1	1	1	1	.	.	.	.	.	.	.	.	4	4	1	1	.	1	4	4	1
184	.	.	.	0	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
185	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	1	1	0	0	0	1	0	.	1	1	0	0	0	1	.	0	0	0	.	.	1	1	0	0	.
186	1	4	4	0	1	.	.	.	.	.	.	0	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
188	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

VERTEBRAL OSTEOARTHRITIS OBSERVATIONS IN NORTHESTERN THAILAND ADULTS

OBS	L2RINF	L2LISUP	L2LINF	L3BODSUP	L3BODINF	L3RSUP	L3RINF	L3LSUP	L3LINF	L4BODSUP	L4BODINF	L4RSUP	L4RINF	L4LSUP	L4LINF	L5BODSUP	L5BODINF	L5RSUP	L5RINF	L5LSUP	L5LINF	SACBOD	SACRSUP	SACLSUP	INSTCODE	YREXAM	PHASE	CARD7	SEX7	AGE	SITE	BURID
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M5	7	1	7	NNT	2 95
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M5	7	2	7	NNT	2 98
183	.	1	.	4	4	.	1	.	1	4	0	1	1	1	1	4	4	1	1	1	1	1	.	.	NLV	94	M1	7	2	2	NNT	2 103
184	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	2	7	NNT	2 108
185	.	.	.	0	0	1	1	.	.	.	.	.	.	1	1	0	1	1	1	1	.	.	.	.	NLV	94	M1	7	1	2	NNT	2 110
186	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	NLV	94	E3	7	2	3	NNT	2 117
187	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	M1	7	2	7	NNT	2 123
188	.	.	1	.	.	1	1	1	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	NLV	94	M4	7	2	2	NNT	2 124
189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	NLV	94	E1	7	2	2	NNT	2M125

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
1	7	.	7	.	.	.	.	.	.	.	.	5	5
2	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	7	.
4	.	1	7	3	.	1	1	7	1	.	7	2	3
5	2	.	.	.	.	.	.	.	.	.	.	5	.
6	.	.	.	.	.	.	.	.	.	.	.	7	2
7	7	.	.	3	4	.	.	.	7	.	.	.	.
8	1	1	3	1	3	7	7	7	7	.	.	4	3
9	4	.	.	.	.	.	.	.	.	.	.	.	3
10	4	.	.	3	3	.	.	.	.	.	.	.	.
11	1	1	.	1	.	.	.	.	.	.	.	3	.
12	.	.	.	7	.	.	.	.	.	.	.	5	.
13	.	.	.	.	.	2	2	.	.	.	.	2	2
14	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	2	.	2	.	.	.	.	.	.	.	.	.
16	7	.	.	.	.	.	.	.	.	.	.	.	2
17	4	2	2	2	2	.	.	.	.	.	.	2	7
18	9	7	.	2	3	.	.	.	.	.	.	7	.
19	1	1	1	1	1	1	1	1	1	.	.	1	1
20	.	.	.	.	.	.	.	.	.	.	.	3	3
21	.	6	.	.	.	.	.	.	.	.	.	.	.
22	2	1	8	1	1	1	7	1	.	.	.	3	2
23	.	.	.	.	.	.	.	.	.	.	.	5	.
24	4	.	4	.	4	4	4	4	4	.	.	4	3
25	.	.	.	.	.	.	.	.	.	.	.	2	2
26	4	3	2	3	2	1	1	1	1	.	1	6	6
27	1	3	8	1	3	.	.	1	.	7	7	2	3
28	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	9	.	9	.	7	7	.	.	.	.	2	2
31	.	.	.	3	.	.	.	.	.	.	.	.	1
32	2	.	.	3	.	.	.	.	.	.	.	.	3
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	9	8	1	3	.	.	.	.	.	.	.	9	.
35	.	.	.	.	.	.	.	.	.	.	.	2	.
36	.	3	.	3	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
1	.	.	7	5	.	7	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.
3	7	.	2	2	2	3	.	.	.	.	.	.
4	.	7	4	2	2	2	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	1	.	.	.
6	.	1	5	2	5	2	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.
8	1	1	.	1	.	1	1	.	.	1	.	.
9	.	.	.	.	.	.	.	1	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	9	.	1	7	.	.	1	1	.	.
12	.	.	7	.	7	.	.	.	.	.	.	.
13	.	.	6	.	.	.	.	.	.	.	.	.
14	.	.	1	1	1	1	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.
17	.	1	2	7	3	7	1	.	.	.	.	.
18	.	.	2	9	2	2	.	.	.	.	.	.
19	1	1	1	1	1	1	.	1	1	1	1	1
20	.	.	2	2	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	9	9	.	.	1	1	1	1	1	1
23	.	.	5	5	2	2	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.
25	1	.	2	9	2	2	.	1	1	.	.	.
26	.	1	2	2	.	2	.	.	1	1	.	.
27	.	.	.	2	.	7	.	.	.	.	.	.
28	.	.	2	5	3	7	.	.	.	.	.	.
29	.	.	2	2	4	.	.	.	.	.	.	.
30	.	1	1	2	2	2	1	1	1	1	.	1
31	.	.	1	.	.	.	.	.	.	.	.	.
32	.	1	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	1	.
35	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	1	.	.	.	.	.	.	.	3
5	7	.	.	1	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	1	1	1	1
9	.	.	.	1	.	.	.	.	.	.	.	4	.	1
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	1	.	.	.	.	.	1	1	3	1
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	7	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	1	1	1	1	1	1	.	1	.	.	1	1	5	1
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	1	.	1	.
25	.	.	.	1	.	1	.	.	.	.	1	.	1	.
26	.	.	1	1	.	.	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	1	.	1	1	.	1	.	.	.	1	4	.	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	1	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	1	.	1	.	.	.	.	.	.	.	.	.	.	1
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
1	.	.	.	.	.	.	.	1	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	3	.	.
4	.	.	.	3	.	.	.	.	.	.	1	1	3
5	3	.	.	.	.	.	3	.	.	.	.	.	.
6	.	.	.	.	.	.	.	1	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.
8	1	1	.	2	.	2	.	.	.	.	.	1	.
9	.	1	2	2	.	2	.	3	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	1	1	3	3	3	.	7	7	.	.	1	.	1
12	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	1	.	1
15	1	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	7	.
17	.	.	.	.	.	.	4	.	.	.	1	7	7
18	5	.	3	.	.	.	.	.	.	.	1	.	7
19	1	1	1	1	.	1	11	7	.	.	1	1	1
20	.	1	.	.	.	.	.	1	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.
22	1	1	2	1	2	1	4	8	.	.	1	7	7
23	.	.	.	.	.	.	.	.	.	.	.	7	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.
25	1	.	.	.	.	.	1	.	.	.	1	7	.
26	2	3	2	.	3	.	.	2	.	.	.	1	.
27	.	.	.	.	.	.	8	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	7	7	7
30	1	2	1	1	1	.	.	9	.	.	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	2	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	1	.	1	.	1	.	3	.	.	.	.	1
35	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
1	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.
4	4	.	3	.	.	1	1	1	1	1	1	.	3
5	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.
8	1	.	.	.	.	.	1	.	1	.	1	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	4	1	1	1	.	1	.	.	.	1	1	1	1
12	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.
14	1	.	.	1	.	1	1	.	1	.	1	1	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.
17	7	7	.	7	7	1	1	1	1	1	.	1	7
18	7	1	.	.	1	.	.	1	.	.	.	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1
20	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	1	.	1	7	1	.	1	.	1	.	.	.
23	7	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.
25	7	1	.	1	1	.	1	.	.	1	.	.	.
26	7	.	.	.	.	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.
28	.	.	.	1	.	1	.	1	.	.	.	7	.
29	7	7	7	7	.	7	.	.	7	.	7	7	.
30	1	1	1	1	1	1	1	1	1	1	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	3	3	3	3	3	3	3	.	4	1	.	.	3	.	.	3
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3
11	3	1	3	1	3	1	1	1	.	1	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	5
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	1	.	.	1	.	1	1	1	1	1	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	2	5	3
16	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3
17	3	3	3	2	3	3	3	3	4	4	.	.	.	.	.	.
18	8	.	8	.	8	.	8	.	1	.	.	.	.	.	.	.
19	1	1	1	1	1	1	1	1	6	1	.	.	3	1	1	1
20	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.
22	.	.	1	.	1	.	1	.	.	.	.	.	1	1	1	1
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	1	.	1	.	2	.	4	.	.	.	.	.	.
26	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
28	3	3	3	3	3	.	3	.	.	.	.	.	.	.	.	.
29	7	.	7	.	7	.	7	.	.	.	.	.	.	.	.	.
30	1	1	1	1	1	1	1	1	8	2	.	.	.	.	.	.
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	1	.	.	.	.	.	.	.	3	.	.	2
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	1	.	.	.	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	4	4	3	3	3	.	3	3	5	.	.	.	.	.	.	.
8	.	.	.	.	.	5	5	5	3	3	3	4	3	1	1	.	3	5	2	2	5	.	5	.	.
9	.	.	.	3	5	5	2	5	6	2	5	6	5	.	.	.	.	.	.	.	.	.	.	.	2
10	3	2	1	.	5	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	2
11	.	.	.	.	.	.	.	5	3	6	1	5	5	1	1	.	1	1	5	3	3	.	1	.	.
12	3	.	.	.	.	.	.	.	.	.	.	.	2	5	.	.	.	.	.	2	3	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	2	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
19	1	1	1	.	.	.	.	.	.	.	3	1	1	1	1	.	1	1	1	1	1	.	1	.	.
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	7	3	.	5	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
22	1	1	1	1	1	1	1	1	1	3	1	3	1	1	1	1	5	5	3	1	3	.	4	1	.
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	1	1	1	1	1	.	1	.	.
27	.	1	1	1	1	1	5	5	5	1	3	2	5	.	.	.	1	1	1	1	1	.	3	.	5
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	.	.	.	.	7	.	.
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	1	3	3	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	1	.	.	.	.	.	.	.	.	.	7	1	1	1	1	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	2	.	.	.	2	.	.	2	.	2	2	2	2	2	2
9	2	2	2	2	2	2	.	2	.	.	.	.	.	.	.
10	.	2	.	2	.	2	.	2	.	2	.	.	.	.	.
11	2	.	2	2	2	2	2	2	2	2	2	2	2	2	2
12	1	2	.	2	2	.	2	.	2	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	3	.	2	.	4	.	4	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	.	2	.	2	.	2	.	2	.	.	.	.	.
19	2	3	.	4	2	4	2	4	.	3	.	3	.	.	.
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	3	.	.	.	.	4	.	4	.	4	.	3	.	.	.
22	3	.	3	2	2	2	2	2	2	2	2	2	2	5	2
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	.	.	.	.	.	.	.	3	4	3	2	.	2	.	2
27	.	5	.	5	.	5	.	5	5	.	2	.	5	.	3
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	.	.	.	.	.	.	3	.	.	.	3	.	.	3
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	3	.	3	3	.	3	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	2	.	2	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	2	.	2	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
1	.	.	.	.	.	.	.	.	.	.	2	.	.
2	.	.	.	.	.	.	.	.	.	.	2	2	2
3	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	2
8	2	.	.	.	.	1	.	1	.	.	1	1	2
9	.	.	.	.	.	.	.	.	.	.	.	.	2
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	2	.	2	.	2	.	2	2	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	2	.	2
13	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	2
16	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	2
19	.	.	.	.	.	.	.	2	.	.	1	1	1
20	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	2	2	.
22	5	2	5	3	2	5	.	2	.	1	1	1	2
23	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	2	2	2
25	.	.	.	.	.	.	.	.	.	.	.	.	.
26	.	4	.	1	.	4	.	.	.	.	.	.	2
27	.	.	.	.	.	.	.	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.
30	2	.	.	.	.	.	.	.	.	.	.	.	.
31	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	1	1	1
35	.	.	.	.	.	.	.	.	.	.	2	2	.
36	2	.	2	.	2	.	2	.	.	.	.	.	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
1	.	.	.	.	.	.	.	.	.	.	.	.	.	2
2	2	2	2	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	2	.	.	1	2	2	.	2	.	.	1	.	2
5	.	.	.	.	.	.	.	.	.	.	.	.	.	2
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	2	.	.	2	2	.	.	.	.	.	.	2	2	2
8	2	2	1	2	1	.	.	.	1	.	.	1	1	.
9	.	2	.	2	.	1	.	1	.	.	.	1	.	1
10	.	.	.	.	.	.	.	1	.	.	.	.	.	2
11	2	.	.	.	.	.	.	2	2	.	.	.	.	2
12	.	2	2	1	1	2	.	.	.	.	.	1	1	2
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	1	1	1	2	.	.	2	2	.	.	.	.	1
16	2	2	1	1	1	1	.	.	.	2	.	.	1	1
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	2	.	.	.	2	.	.	2	1	.	.	.	.	2
19	1	1	1	1	2	1	1	1	1	.	.	1	1	1
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	2	.	.	.	.	.	.	.	.	.
22	1	1	1	2	1	2	1	1	2	2	2	.	1	1
23	2	2	2	.	.	.	.	.	.	.	.	.	.	2
24	2	.	.	2	2	.	.	1	1	.	.	.	.	2
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	2	2	2	.	.	.	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.	2
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	.	.	.	.	.	.	.	.	.	.	.	.	.	2
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	2	.	.	2	.	2	.	2	.	.	.	.	1	1
33	.	.	.	2	.	.	.	.	.	.	.	1	.	2
34	2	2	2	1	2	2	2	1	2	.	.	1	1	2
35	.	.	.	.	.	.	2	.	.	.	.	.	.	2
36	.	1	1	2	.	.	.	.	.	.	.	.	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
1	.	.	.	.	UHM	3	3	2	7	bc1	1
2	.	.	.	.	UHM	3	3	3	5	bc1	1a
3	.	.	.	.	UHM	3	3	2	1	bc1	2
4	2	.	.	.	UHM	3	3	2	1	BC1	4
5	2	.	.	.	UHM	3	3	1	2	BC1	5
6	.	.	.	.	uhm	3	3	1	2	bc1	6
7	2	.	.	.	UHM	3	3	1	2	BC1	7
8	2	.	.	.	UHM	3	3	2	2	BC1	8
9	.	.	.	.	UHM	3	3	1	2	BC1	9
10	2	.	.	.	UHM	3	3	3	4	BC1	10
11	2	.	.	.	UHM	3	3	2	1	BC1	11
12	.	3	.	.	UHM	3	3	1	2	BC1	12
13	.	.	.	.	UHM	3	3	1	7	BC1	13
14	.	.	.	.	UHM	3	3	2	7	BC1	15
15	2	.	.	.	UHM	3	3	2	1	BC1	16
16	.	1	.	.	UHM	3	3	2	2	BC1	17
17	.	.	.	.	UHM	3	3	1	2	BC1	18
18	2	.	.	.	UHM	3	3	2	1	BC1	19
19	1	3	.	.	UHM	3	3	1	1	BC1	20
20	.	.	.	.	UHM	3	2	2	7	BC1	21
21	.	.	.	.	UHM	3	3	1	1	BC1	22
22	1	3	.	.	UHM	3	3	1	2	BC1	23
23	2	.	.	.	UHM	3	3	2	3	BC1	24
24	2	.	.	.	UHM	3	3	1	4	BC1	25
25	.	.	.	.	UHM	3	3	1	2	BC1	26
26	.	.	.	.	UHM	3	3	2	1	BC1	27
27	2	.	.	.	UHM	3	3	2	2	BC1	28
28	.	.	.	.	UHM	3	3	3	1	BC1	29
29	.	.	.	.	UHM	3	3	2	7	BC1	30
30	.	.	.	.	UHM	3	3	2	3	BC1	31
31	.	.	.	.	uhm	3	3	1	1	BC1	32
32	.	.	.	.	UHM	3	3	2	2	BC1	33
33	.	.	.	.	UHM	3	3	2	2	BC1	33A
34	2	.	.	.	UHM	3	3	2	2	BC1	34
35	.	.	.	.	UHM	3	3	3	6	BC1	34A
36	2	.	.	.	UHM	3	3	1	2	BC1	35

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
37	.	.	.	.	7	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	1	1	1	1	7	7	1	1	.	.
40	1	1	.	1	.	.	.	7	.	.	.	.	.	2
41	.	.	.	3	1	.	1	7	.	.	.	.	.	.
42	.	.	.	2	2	.	.	7	.	.	.	.	.	2
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	1	2	.	1	7	7	7	7	1	1	2
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	7	.	.	.	7	.	.	.	1	9
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	8	.	.	.	.	.	.	.	.	.	2
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	.	2	.	4	2	1	.	.	.	1	.	.	.	2
57	1	1	.	1	1	1	1	7	7	1	1	1	1	1
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	3	.	.	.	.	.	.	.	.	.	.
60	.	.	.	1	.	.	.	1	.	.	.	.	.	1
61	.	.	.	1	.	7	.	7	7	.	.	.	.	1
62	.	.	.	4	.	1	.	.	7	1	1	.	1	3
63	1	1	.	1	1	1	1	7	7	.	.	1	.	1
64	.	.	.	2	2	.	.	7	.	1	.	.	.	9
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	.	.	1	1	.	.	.	1	.	.	.	.	1
68	.	.	.	.	1	.	1	2	1	.	.	.	.	2
69	.	.	.	1	.	.	.	1	.	.	.	.	.	1
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	1	.	1	1	1	1	.	.	1	.	1	.	3
72	1	1	.	1	1	.	.	1	.	.	.	.	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
37	2	.	.	.	.	.	.	1	1	.	.	2	2
38	.	.	.	.	.	.	.	.	.	.	.	.	.
39	2	2	2	2	2	1	1	1	1	1	1	2	2
40	7	3	.	3	7	7	1	7	1	.	.	5	6
41	2	1	1	1	1	1	1	1	1	1	1	.	.
42	.	2	.	2	.	.	.	.	.	.	.	.	.
43	1	.	.	.	.	.	.	.	1	.	.	1	2
44	9	8	1	8	.	7	7	7	7	.	.	8	1
45	.	.	.	.	9	1	.	.	.	.	.	5	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.
47	9	3	8	7	5	7	.	7	.	1	1	1	9
48	.	.	.	.	.	.	.	.	.	.	.	2	.
49	7	8	2	5	8	.	.	.	.	.	.	7	2
50	4	.	.	.	.	7	7	7	7	.	.	1	1
51	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.
56	.	3	.	3	.	2	.	2	2	.	.	2	2
57	4	3	1	3	1	7	7	7	7	7	7	2	2
58	.	.	2	.	.	7	.	.	.	.	.	7	.
59	4	.	.	.	2	.	.	.	.	.	.	5	5
60	.	1	.	1	.	1	.	1	1	.	.	.	3
61	9	1	8	1	8	7	7	7	7	7	7	2	2
62	1	3	1	2	1	7	7	7	7	.	.	2	8
63	1	1	1	1	1	7	1	7	1	7	1	1	1
64	7	8	1	8	1	7	7	.	1	.	.	3	3
65	.	1	2	1	7	1	1	1	1	.	.	1	1
66	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	1	1	1	1	1	1	1	1	1	1	1	1
68	1	3	.	3	.	1	1	1	1	1	1	1	4
69	.	.	1	.	1	2	1	2	1	.	1	2	3
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.
72	4	1	7	1	1	.	.	1	1	.	1	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
37	.	.	2	2	2	2	.	.	.	.	.	.
38	.	.	.	8	.	4	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	2	.	2	.	.	.	.	.	.
44	.	.	2	.	4	9	.	.	.	.	.	.
45	.	.	9	.	5	.	.	.	.	.	.	.
46	.	.	9	2	9	2	.	.	.	.	.	.
47	7	7	8	9	2	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	2	2	2	2	.	1	.	1	.	.
50	1	1	1	1	1	9	.	.	.	.	.	.
51	.	.	2	2	2	2	.	.	.	.	.	.
52	.	.	4	4	4	9	.	.	.	.	.	.
53	.	.	3	3	3	3	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.
56	1	1	2	2	2	2	.	.	.	.	.	.
57	.	1	2	2	7	1	.	.	.	.	1	.
58	1	.	2	2	2	7	.	.	.	.	.	.
59	.	.	2	2	2	2	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	4	4	2	.	.	1	1	.	.
62	4	4	7	2	9	9	1	1	1	1	1	.
63	.	.	.	.	.	7	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.
65	1	1	1	1	2	1	1	1	1	1	1	1
66	.	.	.	.	.	.	.	.	.	.	.	.
67	.	.	1	1	7	1	.	.	.	.	.	.
68	.	.	1	1	1	1	.	.	.	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	.
70	1	1	1	8	2	2	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	1	1	1	1	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	1	.	1	.
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	1	.
42	.	.	.	.	.	.	.	.	.	.	.	7	2	2
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	1	.	.	.	.	.	.	1	.	1	.
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	1	.	.	.	.	.	.	.	.	.	4	.	1	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	1	.	.	.	1	.	.	.	.	.	2	1	2
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	2	.	2	.
57	.	.	.	.	.	.	.	.	.	.	1	7	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	.	.	.	.	.	.	.	.	.	.	1
60	.	.	1	.	.	.	.	.	.	.	1	.	1	.
61	.	.	1	.	1	.	.	1	.	.	1	.	1	1
62	1	1	1	.	1	1	.	1	.	1	1	1	1	1
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.	3	5
65	.	.	.	.	.	1	.	.	.	.	1	1	1	2
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	.	.	.	.	.	.	.	.	.	.	.	.	.
68	.	.	.	.	.	.	.	.	.	.	2	.	2	.
69	.	.	.	.	.	.	.	.	.	.	.	1	.	2
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	.	.	.	.	.	.	.	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
37	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	1	.	.	.	.	3	.	.	.	.	.
40	.	.	.	.	.	.	3	.	.	.	.	.	.
41	.	.	.	.	.	.	1	.	.	.	.	.	.
42	2	2	2	3	.	2	1	6	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	1	.	.	1	5	2	.	.	1	1	7
45	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	7	1	4
47	2	.	2	.	1	.	3	3	.	.	7	1	7
48	.	.	.	.	.	.	.	.	.	.	.	.	.
49	2	.	.	1	1	.	7	6	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	1	1	1
51	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	1	.	1
53	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.
56	2	.	.	.	.	.	2	.	.	.	7	7	7
57	.	4	.	5	.	.	1	5	.	.	.	7	.
58	.	.	.	.	.	.	.	1	.	.	.	.	.
59	.	1	.	1	.	1	.	8	.	.	1	.	1
60	1	.	.	.	1	.	7	.	.	.	1	.	1
61	1	4	.	.	1	.	7	5	.	.	1	.	1
62	1	1	1	1	1	1	14	13	.	.	.	4	7
63	.	.	.	.	.	.	.	.	.	.	.	1	.
64	.	3	5	5	5	.	4	.	.	.	.	.	.
65	1	.	1	3	3	1	5	5	.	.	.	1	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	.	1	.	.	.	2	1	.	.	.	.	.
68	2	.	2	.	.	.	6	4	.	.	1	.	1
69	.	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	1	.	.	.	.	.	.	.	.	.	.	.
72	1	1	.	1	.	1	4	11	.	.	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
37	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	1	1	1	1	.	1	1	1	.	.	.
45	.	.	.	.	.	.	.	.	.	.	.	.	.
46	7	.	7	7	7	1	.	1	1	.	.	4	2
47	7	.	.	7	.	.	.	.	.	.	.	1	2
48	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	1	7	1	.	.	.	.	.	.
50	1	1	1	1	1	1	1	1	1	1	1	1	1
51	.	.	.	.	.	.	.	.	.	.	.	.	.
52	1	1	1	.	.	.	1	.	1	.	1	1	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.
56	7	7	.	7	.	.	.	1	.	7	1	.	7
57	7	.	.	.	7	.	.	.	.	.	.	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.
59	.	1	.	.	.	.	.	.	.	.	.	.	.
60	.	.	.	1	.	1	.	1	.	1	.	1	.
61	.	.	1	1	.	.	.	.	1	.	.	.	.
62	7	.	1	1	1	1	1	1	1	.	1	1	.
63	1	.	.	.	.	.	.	.	.	.	.	.	1
64	.	.	.	.	.	.	.	.	.	.	.	.	.
65	7	.	1	.	.	.	1	.	1	.	1	4	4
66	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	.	.	.	.	.	.	.	.	.	.	.	1
68	.	.	.	.	.	.	.	.	.	.	.	1	1
69	.	.	.	.	.	.	.	.	.	.	.	.	.
70	1	.	.	.	.	.	1	.	.	.	1	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.
72	1	1	.	.	.	.	.	.	.	.	.	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	3	1	1	3
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	3	2	3	3
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	3	3	3	.	3	3	1	2	.	.	.	.	.	.
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	9	2	2	2	8	2	8	.	7	.	.	.	.	.	.	.
47	2	.	2	3	2	1	.	.	3	1	.	.	7	7	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	2	.	2	.	.	1	1	.	.	.	7	7	7
50	1	1	1	1	1	1	1	1	.	9	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	2	1	1	1	1	3	3	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.	3	.	2	5
57	.	.	.	.	.	.	.	3	.	.	.	.	.	3	2	3
58	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	.	.	.	.	.	.	.	.	.	7	.	7	7
60	1	.	1	.	1	.	1	.	2	.	.	.	1	1	1	1
61	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.
62	1	1	1	1	1	1	1	1	5	.	.	.	.	.	.	2
63	.	1	.	1	.	1	.	1	.	.	.	.	5	5	5	5
64	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2
65	.	2	.	3	.	3	.	1	2	3	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	1	.	1	1	1	1	1	.	1	.	.	5	5	5	5
68	1	1	1	1	.	1	.	1	.	.	.	.	3	.	2	2
69	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	5
70	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	3	1	1	5
72	1	1	1	1	1	.	.	.	.	1	.	.	5	5	5	5

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
37	2	.	.	.	3	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	3	3	3	3	3	3	3	.	.	3	3	3	.	3	3	.	3	1	1	1	3	.	1	1	5
40	.	.	.	.	.	.	.	.	3	3	3	5	5	.	.	.	.	.	.	.	.	.	.	.	2
41	.	.	.	5	5	5	5	5	5	5	5	5	5	5	5	.	5	5	5	5	5	.	5	.	1
42	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	1	1	3	3	3	3	3	3	3	3	3	5	.	.	3	.	3	3	.	3	.	1
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	3	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	7	.	.	.	.	.	7	7	.	.	.	7	.	.	.	.	.	.	.	.	.	.	2
50	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	1	.	7	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	5	.	5	.	.
57	.	5	1	1	1	2	3	3	5	.	3	3	5	3	3	.	.	2	3	2	3	.	2	.	5
58	.	.	.	.	.	.	.	.	.	.	7	7	3	3	3	.	7	7	3	3	.	.	.	.	.
59	7	7	.	.	.	2	2	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
60	1	1	1	1	5	5	5	5	3	5	5	.	.	.	.	.	2	2	2	5	3	.	2	.	.
61	1	2	3	3	3	3	2	3	3	3	2	3	3	3	3	.	3	3	.	.	.	.	2	.	1
62	3	3	.	.	2	.	3	3	.	.	.	.	3	.	3	.	3	5	5	5	2	.	3	.	3
63	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	.	5	5	5	5	5	.	5	.	1
64	2	5	.	5	3	2	.	.	.	.	.	.	2	2	.	.	3	3	3	2	.	.	2	.	.
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	1	1	1	1	.	1	1	1
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	.	5	5	5	5	5	.	.	.	1
68	2	2	.	.	.	2	2	2	2	2	2	2	2	2	2	.	.	.	.	.	.	.	.	.	.
69	5	5	.	3	3	3	5	5	5	5	3	3	3	3	3	.	2	2	3	.	.	.	3	.	1
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	5	3	3	1	3	5	5	5	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
72	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	.	5	5	5	5	5	.	3	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	1	5	3	5	3	5	5	5	5	5	5	5	5	5	5
40	.	2	.	.	.	2	.	2	2	2	.	2	.	.	.
41	1	3	1	3	1	3	3	1	3	3	1	3	1	3	1
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	1	2	2	2	2	2	2	2	2	2	2	2	.	2	.
45	.	.	.	.	2	2	2	2	.	2	.	2	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	3	4	3	4	3	4	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	3	.	.	.	3	.	3	3	.	3	.	3	.	3	.
57	2	2	3	3	3	2	.	2	.	2	.	2	2	3	.
58	.	.	.	.	2	.	2	.	2	.	2	.	2	.	2
59	.	.	.	.	3	3	3	3	.	3	.	3	.	3	.
60	.	2	.	2	.	2	.	2	.	2	.	2	.	2	.
61	2	1	2	.	.	2	2	2	2	2	2	2	2	2	2
62	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
64	.	.	.	.	.	.	2	.	2	.	2	.	.	.	.
65	.	.	.	.	.	.	.	1	.	.	.	4	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	1	1	.	1	2	1	2	1	2	1	2	1	2	1	2
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	1	2	2	2	2	2	2	2	2	2	2	.	2	.	2
72	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
37	.	.	.	.	.	.	.	.	.	.	2	2	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.
39	5	2	5	2	5	1	5	2	.	.	2	2	2
40	2	.	2	.	.	.	.	.	.	.	.	.	.
41	3	3	3	3	3	1	3	.	.	.	2	2	2
42	.	.	.	.	.	.	.	.	.	.	2	2	2
43	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	.	.	.	.	.	.	.	2	2	1
45	.	.	.	.	.	.	.	.	.	.	.	.	2
46	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	1	1	2
48	.	.	.	.	.	.	.	.	.	.	2	2	2
49	.	.	.	.	.	.	.	.	.	.	2	2	2
50	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	1	1	2
56	3	.	.	.	.	.	.	.	.	.	1	1	2
57	3	.	.	.	4	2	4	2	.	.	2	2	2
58	.	2	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	.	.	.	.	.	.	.	.	.	.
60	2	.	2	.	.	.	.	.	.	.	.	.	2
61	2	2	2	.	.	.	.	.	.	.	.	.	.
62	.	.	.	.	.	.	.	.	.	.	.	.	2
63	1	1	1	1	1	1	.	1	.	.	2	2	2
64	.	.	.	.	.	.	.	.	.	.	2	2	1
65	.	.	.	.	.	3	.	1	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	1	2	1
67	1	1	1	1	1	1	.	.	.	.	2	2	2
68	.	.	.	.	.	.	.	.	.	.	.	.	.
69	1	2	1	.	1	.	.	.	.	.	.	2	2
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	2	.	2
72	1	1	1	1	.	1	.	1	.	.	2	2	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
37	2	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	2	2	2	1	2	.	.	2	2	.	.	1	1	2
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	2	2	2	.	.	.	.	.	.	.	.	.	.	1
42	2	.	.	2	2	2	2	1	1	.	.	1	2	1
43	.	.	.	.	.	.	.	.	.	.	.	.	.	1
44	1	1	1	1	2	2	2	2	2	.	.	1	1	1
45	.	2	.	.	.	.	.	.	.	.	.	1	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	2	2	.	2	2	1	1	1	1	.	.	1	1	2
48	.	2	2	.	.	.	.	.	.	.	.	1	.	.
49	2	2	.	2	2	.	.	2	1	.	.	1	1	2
50	.	.	.	.	1	.	.	.	2	.	.	.	1	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	2	2	.
55	2	1	1	2	.	.	.	.	.	.	.	2	.	.
56	1	1	1	1	1	1	1	2	2	1	1	1	1	.
57	.	.	.	2	2	.	.	2	2	.	.	2	2	2
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.
59	2	.	2	.	.	.	.	.	.	.	.	1	1	.
60	.	2	2	.	.	.	.	1	1	.	.	.	.	2
61	.	.	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	.	2	2	.	.	1	.	.	.	.	.	2
63	1	1	1	1	2	1	.	2	2	.	.	1	1	1
64	1	2	2	.	.	.	.	.	.	.	.	.	.	.
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	1	1	1	1	2	2	2	.	.	.	.	1	.	1
67	2	2	2	2	2	.	1	.	.	.	.	1	1	2
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	1	.	.	.	.	1	.	.	.	.	.	.	.	2
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	2	2	2	1	1	.	.	.	.	.	.	1	1	1
72	2	2	2	2	2	2	.	2	2	.	.	1	1	2

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SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
37	2	.	.	.	UHM	3	3	3	5	BC1	36
38	.	.	.	.	UHM	3	3	1	1	BC1	37
39	2	.	.	.	UHM	3	3	1	5	BC1	38
40	.	.	.	.	UHM	3	3	1	1	BC1	39
41	1	.	.	.	UHM	3	3	2	5	BC1	40
42	1	.	.	.	UHM	3	3	2	1	BC1	41
43	1	.	.	.	UHM	3	3	1	5	BC1	42
44	1	.	.	.	UHM	3	3	1	1	BC1	43
45	.	.	.	.	UHM	3	3	3	6	BC1	43A
46	.	.	.	.	UHM	3	3	1	2	BC1	44
47	2	3	.	.	UHM	3	3	2	1	BC1	45
48	.	.	.	.	UHM	3	3	3	6	BC1	46
49	2	.	.	.	UHM	3	3	1	1	BC1	47
50	.	.	.	.	UHM	3	3	2	2	BC1	48
51	.	.	.	.	UHM	3	3	3	5	BC1	49
52	.	.	.	.	UHM	3	3	1	7	BC1	50
53	.	.	.	.	UHM	3	3	3	5	BC1	52
54	.	.	.	.	UHM	3	3	3	5	BC1	53
55	.	.	.	.	UHM	3	3	1	1	BC1	54
56	2	.	.	.	UHM	3	3	2	1	BC2	1
57	2	.	.	.	UHM	3	3	1	1	BC2	2
58	.	.	.	.	UHM	3	3	2	2	BC2	3
59	.	.	.	.	UHM	3	3	3	6	BC2	4
60	1	.	.	.	UHM	3	3	1	5	BC2	5
61	.	.	.	.	UHM	3	3	1	2	BC2	6
62	2	.	.	.	UHM	3	3	1	2	BC2	7
63	1	.	.	.	UHM	3	3	2	5	BC2	8
64	.	.	.	.	UHM	3	3	2	1	BC1	9
65	.	.	.	.	UHM	3	3	1	1	BC2	10
66	.	.	.	.	UHM	3	3	2	2	BC2	11
67	2	.	.	.	UHM	3	3	1	6	BC2	12
68	.	.	.	.	UHM	3	3	1	6	BC2	13
69	2	.	.	.	UHM	3	3	2	6	BC2	14
70	.	.	.	.	UHM	3	3	2	7	BC2	15
71	1	.	.	.	UHM	3	3	2	2	BC2	15A
72	2	.	.	.	UHM	3	3	1	6	BC2	16

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	1	.	1	1	1	1	2	2	1	1	1	1	1
75	1	.	.	.	1	.	1	.	7	.	7	.	.	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	1	1	.	1	1	1	.	7	.	1	.	1	.	8
80	.	.	.	.	.	.	.	.	.	.	.	.	.	5
81	1	1	.	1	1	1	1	7	7	.	.	.	.	1
82	.	7	.	8	8	7	1	7	7	.	.	.	1	1
83	.	.	.	2	.	1	.	7	.	7	.	.	1	4
84	.	.	.	1	1	1	1	7	7	1	1	1	1	1
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	1	1	1	1	7	7	1	1	1	1	1
87	7	7	.	1	1	.	1	7	7	.	1	.	1	.
88	1	.	.	1	1	1	1	7	7	1	1	1	1	1
89	1	2	.	8	1	1	1	7	7	1	1	1	1	1
90	1	.	.	2	2	1	1	7	7	1	1	1	1	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.	7
92	.	7	.	.	.	.	.	.	.	.	.	.	.	.
93	1	1	.	1	1	1	1	1	1	.	.	.	.	1
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	.	7	.	2	2	1	1	7	7	.	1	1	1	1
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	1	.	1	.	.	.	.	.
99	1	1	.	1	1	1	1	7	1	.	.	.	.	1
100	.	.	.	.	.	.	1	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	1	1	1	1	7	7	1	1	1	1	1
103	1	1	.	1	1	1	1	7	7	1	1	1	1	1
104	.	.	.	1	1	.	.	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	2	2	.	1	.	.	.	.	.	.	.
107	.	1	.	1	1	1	1	7	7	1	1	1	1	1
108	7	7	.	1	1	1	1	7	7	1	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
73	.	.	.	.	.	.	.	.	.	.	.	.	.
74	4	1	1	1	1	1	.	1	1	.	.	1	4
75	1	.	1	4	1	.	.	.	.	.	.	9	4
76	4	.	.	.	.	.	.	.	.	.	.	1	.
77	.	1	.	1	1	.	.	.	.	.	.	.	.
78	.	.	2	2	.	.	.	.	.	.	.	.	.
79	1	8	.	3	2	.	7	.	7	.	.	2	8
80	.	.	.	1	.	.	.	.	.	.	.	.	1
81	1	1	1	1	1	1	7	7	7	.	.	1	1
82	1	3	1	3	1	.	7	.	7	.	.	.	3
83	.	8	.	8	7	7	.	7	.	.	2	2	1
84	9	.	.	.	1	7	7	1	1	.	.	1	1
85	.	1	.	1	.	1	.	1	.	.	.	1	.
86	1	1	1	1	1	1	1	1	1	1	1	1	1
87	3	.	4	.	4	.	7	.	7	.	.	.	.
88	1	1	1	1	1	1	7	7	7	.	.	2	2
89	1	8	3	1	3	1	1	1	1	1	1	2	1
90	1	1	1	1	1	7	7	1	1	1	1	8	8
91	7	1	1	1	1	1	1	1	1	1	.	2	2
92	.	.	.	.	7	.	.	.	.	.	.	.	.
93	1	1	1	1	1	1	1	1	1	1	1	1	1
94	.	.	.	.	.	.	.	.	.	.	.	1	9
95	1	1	1	1	1	1	1	1	1	.	7	1	1
96	.	4	.	4	.	.	.	.	.	.	.	1	.
97	.	3	.	2	4	.	7	.	.	.	.	9	9
98	1	.	.	.	.	.	.	.	1	.	.	2	2
99	7	8	1	1	1	1	1	7	1	7	.	3	3
100	.	.	.	.	.	.	7	.	7	.	.	.	.
101	.	.	.	.	.	1	1	.	.	.	.	.	.
102	6	1	1	1	1	1	1	1	1	.	.	1	1
103	1	1	1	1	1	1	1	1	1	1	1	1	1
104	1	.	1	3	1	1	.	1	1	1	1	1	1
105	1	.	2	2	.	7	7	7	7	.	1	1	1
106	2	3	.	8	4	.	7	7	7	.	.	.	.
107	9	1	1	1	1	1	1	1	1	1	1	1	1
108	1	1	1	1	1	1	1	1	1	1	1	3	3

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
73	.	.	.	.	.	.	.	.	.	.	.	.
74	1	.	1	1	1	1	.	.	1	1	1	.
75	.	.	6	9	1	2	.	1	.	1	.	1
76	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	1	9	1	.	.	.	.	.	.
78	.	.	2	.	.	.	.	.	1	.	.	.
79	1	1	1	1	9	9	.	.	.	.	.	.
80	1	.	2	9	9	9	.	.	.	.	.	.
81	.	.	1	1	1	1	.	.	.	.	.	.
82	.	.	.	.	.	.	.	1	.	1	.	.
83	1	.	.	6	.	.	1	.	1	.	.	1
84	1	1	1	1	1	1	1	1	1	1	.	1
85	.	.	1	.	1	2	1	.	.	.	.	.
86	.	1	.	1	1	1	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.
88	1	1	2	1	2	9	.	.	.	.	1	.
89	.	.	1	1	1	1	1	.	1	1	1	1
90	.	.	.	.	.	.	1	1	1	1	.	.
91	.	7	3	6	5	.	1	1	1	1	1	1
92	.	.	.	.	.	.	.	.	.	.	.	.
93	.	.	.	.	.	.	.	.	.	.	.	.
94	1	1	1	1	1	1	.	.	.	.	1	1
95	1	1	1	1	1	9	.	1	1	1	.	1
96	.	.	.	.	.	.	.	.	1	.	1	.
97	1	1	.	.	.	.	.	.	.	.	1	.
98	.	.	1	1	.	.	.	.	.	.	.	.
99	.	.	.	.	2	2	.	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	8	1	9	9	.	.	.	1	.	.
103	1	1	1	1	1	1	1	1	1	.	.	.
104	.	.	1	1	.	1	.	.	.	.	.	.
105	.	.	1	1	9	2	.	.	.	.	.	1
106	.	2	2	.	2	2	.	.	.	.	1	.
107	.	1	1	1	1	1	.	.	.	.	1	.
108	.	.	9	9	1	1	1	1	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	1	.	1	1	1	.	.	.	1	1	1	1
75	.	1	.	1	.	1	.	1	1	1	1	1	.	1
76	.	.	.	.	.	.	.	.	.	.	1	.	1	.
77	.	.	.	.	.	.	.	.	.	.	1	.	1	.
78	1	.	1	.	.	.	.	.	.	.	.	.	.	.
79	.	.	1	.	.	.	.	.	.	.	1	.	1	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	1	2	1	2
82	.	.	.	1	.	1	.	1	.	1	.	1	.	1
83	.	1	.	1	.	.	1	.	.	.	.	.	.	2
84	1	.	1	1	1	.	1	1	.	1	1	1	1	1
85	.	.	1	.	1	.	1	.	1	.	1	.	1	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	1	.	1
88	1	1	.	.	1	.	1	.	.	1	3	1	1	.
89	1	1	1	1	1	1	1	.	.	1	.	1	1	1
90	.	1	.	1	.	1	.	1	.	.	1	.	.	1
91	1	1	1	1	1	1	1	1	.	1	1	1	1	2
92	.	.	.	.	.	.	.	.	.	.	.	4	.	.
93	.	.	1	.	.	.	.	.	.	.	1	1	1	1
94	.	.	.	.	.	.	.	.	.	.	1	.	.	.
95	1	1	1	1	.	1	.	.	.	.	3	1	1	1
96	1	.	1	.	.	.	.	.	.	.	1	.	1	.
97	.	.	.	.	.	.	.	.	1	.	.	.	8	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	1	.	1
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	1	1	1	1
103	1	.	.	.	1	1	.	.	.	.	1	1	1	1
104	.	.	.	.	.	.	.	.	.	.	1	1	1	1
105	.	.	.	.	.	.	.	.	.	.	.	1	1	1
106	.	.	.	.	.	.	.	.	.	.	.	.	1	1
107	.	.	.	.	.	1	.	.	.	.	1	1	1	1
108	1	1	1	1	1	1	.	1	1	1	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
73	.	.	.	.	.	.	.	.	.	.	.	.	.
74	1	1	1	1	1	1	11	9	.	.	1	1	1
75	1	1	.	1	.	1	1	4	.	.	1	1	1
76	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	1	.	2	.	.	.	1	.	1
78	.	.	.	.	.	.	3	.	.	.	.	.	.
79	1	.	.	.	1	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	1	1	1
81	.	.	.	.	.	.	3	2	.	.	1	1	1
82	.	1	.	1	.	1	.	10	.	.	.	.	.
83	.	2	.	2	.	.	3	7	.	.	.	.	.
84	1	1	1	1	1	1	14	11	.	.	.	1	1
85	1	.	1	.	1	.	2	.	.	.	1	.	1
86	.	.	.	.	.	.	.	.	.	.	1	1	1
87	.	.	.	.	.	.	1	3	.	.	.	.	.
88	1	1	4	1	.	1	8	7	.	.	1	1	1
89	1	1	1	1	3	1	7	7	.	.	1	1	1
90	.	1	1	1	1	1	6	6	.	.	.	.	.
91	1	2	1	2	1	2	2	4	.	.	.	.	.
92	.	2	.	2	.	.	.	.	.	.	.	.	.
93	1	1	1	.	2	.	4	5	.	.	.	1	.
94	.	.	1	.	.	1	4	.	.	.	1	1	1
95	1	1	1	2	.	3	6	12	.	.	1	1	1
96	1	.	1	.	1	.	8	3	.	.	.	.	.
97	.	.	1	.	1	1	11	7	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	2	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	1
102	1	1	1	.	1	.	5	1	.	.	.	1	7
103	1	1	1	1	1	1	7	10	.	.	1	1	7
104	1	1	1	1	.	1	8	8	.	.	.	.	.
105	2	1	.	.	4	.	.	2	.	.	1	.	1
106	.	.	1	.	1	.	9	1	.	.	1	.	.
107	.	.	1	.	1	3	5	2	.	.	1	1	1
108	1	1	1	1	.	1	8	3	.	.	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
73	.	.	.	.	.	.	.	.	.	.	.	.	.
74	1	1	1	1	1	1	1	1	1	1	.	1	1
75	1	1	1	1	1	1	.	1	.	1	1	1	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.
77	1	1	1	.	1	.	.	.	.	.	.	1	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	1	.	.	1	.	.	.	.	.	.
81	1	.	.	.	.	.	.	.	.	.	.	1	1
82	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.
84	1	.	1	.	.	.	1	.	1	.	.	.	.
85	.	1	.	.	.	.	.	.	.	1	.	1	.
86	1	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	1	.	.	.	.
88	1	.	1	1	.	1	.	.	1	1	1	1	1
89	1	1	1	1	1	1	1	1	1	1	1	1	1
90	.	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.
93	1	.	1	.	.	.	1	.	.	.	1	1	1
94	1	1	1	1	1	1	1	1	1	1	1	1	1
95	1	1	1	1	1	1	1	1	.	1	.	1	1
96	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	.	.
101	1	.	.	.	.	.	.	.	.	.	.	.	.
102	.	1	1	.	.	.	.	.	.	.	.	.	1
103	7	.	1	.	1	1	1	1	1	1	1	1	1
104	.	.	.	.	.	.	.	.	.	.	.	.	.
105	1	.	1	.	.	.	.	.	.	.	.	.	.
106	7	.	.	.	.	.	1	.	.	.	.	.	1
107	1	1	1	1	1	1	1	1	.	1	1	1	1
108	1	1	1	1	1	1	1	.	1	1	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	1	1	1	1	1	1	1	1	5	3	.	.	1	1	1	1
75	1	.	1	.	1	.	1	.	5	3	.	.	1	1	5	5
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
77	1	.	1	1	.	.	.	.	5	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	1
80	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
81	1	1	1	1	1	1	.	1	.	.	.	.	5	5	5	5
82	.	.	.	.	.	.	.	.	.	.	.	.	3	2	3	3
83	.	.	.	.	.	.	.	.	.	.	.	.	2	3	3	3
84	.	.	.	1	3	1	8	.	1	5	.	.	1	1	1	1
85	3	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
87	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	5
88	1	1	1	1	.	1	.	.	4	9	.	.	1	1	1	1
89	1	1	1	1	1	1	1	1	7	10	.	.	1	.	1	1
90	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	1	1	.	1	.	1	1	1	.	10	.	.	1	1	1	1
94	1	1	.	1	.	1	.	1	3	1	.	.	.	.	.	.
95	1	1	1	1	1	1	1	1	10	14	.	.	3	3	3	3
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
99	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3
101	1	.	1	.	1	.	1	.	1	.	.	.	.	.	.	.
102	.	1	1	1	1	1	1	1	.	2	.	.	1	1	.	.
103	1	1	8	1	1	1	8	1	4	3	.	.	1	1	1	1
104	.	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.
105	.	1	.	1	4	1	.	4	2	.	.	.	.	.	.	.
106	1	.	.	.	.	.	.	3	.	.	.	.	1	1	.	.
107	1	1	1	1	1	1	1	1	9	4	.	.	1	1	1	1
108	1	1	1	1	1	1	1	1	5	5	.	.	.	.	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	1	1	1	5	3	5	3	3	3	1	3	3	3	1	1	.	1	1	1	1	1	.	3	.	1
75	1	2	1	1	1	5	5	3	2	3	1	1	1	1	.	.	.	1	1	1	1	.	7	.	.
76	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	2	5	5	5	5	5	5	5	5	5	5	5	5	5	.	5	5	5	5	5	.	7	.	1
80	.	.	.	.	.	.	.	.	.	.	3	3	3	3	3	.	1	.	.	.	.	.	.	.	.
81	5	5	5	3	3	3	5	5	5	5	5	5	5	.	.	.	.	.	.	.	.	.	2	.	1
82	3	5	5	2	5	3	5	5	5	5	5	5	5	5	5	.	7	7	7	7	7	.	.	.	1
83	3	3	3	4	3	3	3	4	4	4	.	.	3	3	3	.	4	3	3	3	3	.	7	.	2
84	1	1	1	1	1	1	2	5	1	1	1	1	1	1	1	.	.	5	5	5	5	.	1	.	1
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	5	5	5	5	5	.	.	.	.
86	.	.	1	1	1	.	.	.	.	1	.	.	.	.	.	.	1	.	1	1	1	.	1	.	.
87	.	1	1'	1	1	1	1	1	1	1	1	1	1	1	1	.	1	.	.	.	.	.	.	.	.
88	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	3	3	5	.	1	.	1
89	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	5.	3	.	7	.	1
90	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	1	.	3
91	.	.	.	.	.	.	.	.	.	.	.	3	5	5	3	.	5	5	3	3	3	.	7	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
93	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	1	.	1
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	3	3	3	3	3	3	3	3	1	3	3	3	3	3	5	.	3	3	5	3	5	.	1	.	3
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	.	3	3	3	.	.	.	.	.	1
100	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	1	1	1	1	1	1	1	1	1	1	.	5	5	5	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	2	1	.	1	1	.	1	1	.	1	1	.	7	.	.
103	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	1	.	1
104	.	.	.	.	.	5	5	5	5	5	5	5	5	5	5	.	2	2	2	2	2	.	2	.	2
105	.	.	.	3	3	.	5	.	.	.	.	.	.	1	1	.	1	1	1	.	1	.	7	.	.
106	.	1	.	3	.	2	.	.	.	3	.	3	.	5	.	.	.	3	3	3	3	.	.	.	.
107	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	1	.	1
108	1	1	1	5	5	5	1	1	5	5	1	1	1	1	5	.	5	5	5	5	5	.	1	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	1	2	2	2	2	2	2	2	2	2	6	2	6	2	2
75	1	.	5	.	5	.	5	.	5	.	5	.	5	.	5
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	1	1	1	5	2	5	2	1	2	5	1	1	5	1	5
80	.	.	.	.	.	.	.	.	2	.	2	.	.	.	.
81	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
82	1	1	1	5	3	3	2	1	2	1	2	2	2	2	2
83	.	2	.	2	2	3	2	3	2	3	.	3	3	3	3
84	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	2	1	5	5	5	1	5	5	1	2	5	2	5	2	5
89	1	5	5	5	1	5	2	2	1	5	1	1	1	1	5
90	1	.	5	3	.	2	5	2	5	2	3	2	3	2	3
91	.	.	.	.	.	.	.	.	.	.	.	.	3	.	3
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	3	2	2	3	2	3	3	3	2	3	5	3	5	3	5
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
99	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
102	.	2	.	.	2	2	2	5	2	3	.	.	2	.	3
103	1	5	5	5	5	5	1	5	5	5	5	1	5	5	1
104	.	2	2	2	2	2	2	2	2	2	.	2	.	2	.
105	.	3	.	2	2	2	2	.	.	2	.	.	2	2	.
106	.	.	.	.	2	2	.	.	.	.	2	.	2	.	.
107	1	.	.	1	5	1	1	5	1	1	1	5	1	1	5
108	1	3	1	3	5	5	1	5	5	5	5	2	5	1	5

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
73	.	.	.	.	.	.	.	.	.	.	.	2	2
74	2	6	2	2	.	2	.	2	.	.	1	1	1
75	.	5	.	5	.	5	.	.	.	.	1	1	1
76	.	.	.	.	.	.	.	.	.	.	2	.	2
77	.	.	.	.	.	.	.	.	.	.	1	1	1
78	.	.	.	.	.	.	.	.	.	.	.	.	.
79	5	5	1	1	.	1	.	2	.	.	1	1	1
80	.	.	.	.	.	.	.	.	.	.	.	.	.
81	1	.	1	.	.	.	.	.	.	.	2	1	2
82	2	2	2	2	2	2	.	.	.	.	2	2	.
83	3	3	.	.	.	.	.	.	.	.	2	1	1
84	1	1	1	1	1	1	1	1	.	.	.	1	1
85	.	.	.	.	.	.	1	1	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	1	1	1
87	.	.	.	.	.	.	.	.	.	.	.	.	.
88	2	5	2	5	2	1	2	.	.	.	1	1	2
89	2	1	5	1	5	.	.	2	.	.	2	2	2
90	2	3	.	2	2	.	.	.	.	.	1	1	1
91	3	3	2	3	1	2	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.
93	1	1	1	1	1	1	1	1	.	.	1	1	1
94	.	.	.	.	.	.	.	.	.	.	.	.	.
95	3	5	3	5	.	.	.	.	.	.	2	2	2
96	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	2
99	1	1	1	1	1	1	1	1	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	2	.
101	.	.	.	.	.	.	.	1	.	.	1	1	1
102	2	3	2	.	.	.	.	.	.	.	1	1	1
103	5	5	1	1	1	1	1	1	.	.	1	1	1
104	2	.	.	.	.	.	.	.	.	.	.	.	.
105	2	.	.	.	1	1	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.
107	1	1	3	2	1	1	1	1	.	.	1	1	1
108	1	5	1	5	1	1	1	.	.	.	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
73	1	.	2	2	1	.	.	.	.	.	.	.	.	2
74	1	1	1	1	1	1	1	1	1	2	2	1	1	1
75	1	1	1	1	1	.	1	.	1	2	2	1	1	.
76	.	2	2	.	1	2	.	.	.	.	.	2	1	.
77	1	1	1	1	1	1	1	1	1	2	2	1	1	1
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	1	2	2	1	2	1	.	2	2	.	.	.	.	1
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	2	2	2	1	1	.	1	.	1	.	.	1	1	1
82	.	2	.	2	1	2	2	2	2	2	2	.	.	1
83	1	2	2	2	.	.	2	1	1	.	.	.	.	1
84	1	1	1	1	1	1	1	1	1	2	2	1	1	1
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	1	1	1	1	1	1	.	1	1	.	.	1	1	1
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	2	2	2	2	2	1	1	1	1	2	2	1	1	1
89	2	1	1	1	1	1	1	1	1	2	2	1	1	1
90	1	1	1	1	1	1	1	1	1	2	2	1	1	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	1	1	1	1	1	1	1	1	1	.	.	1	1	.
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	2	2	2	2	1	1	2	1	2	.	.	1	1	1
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	2	2	2	.	.	.	.	.	.	.	.	.	.	2
99	.	2	2	.	2	.	.	2	2	.	.	.	.	2
100	.	.	.	.	.	.	2	.	.	.	.	.	.	.
101	1	1	1	1	1	1	1	1	1	.	.	1	1	1
102	1	1	1	1	1	1	1	1	1	2	2	1	1	1
103	1	1	1	1	1	1	1	1	1	1	1	1	1	1
104	.	.	2	.	1	.	1	.	.	.	.	1	1	.
105	1	.	.	1	1	.	.	.	1	.	.	.	.	.
106	2	.	.	.	.	.	.	.	.	2	2	.	.	.
107	1	1	1	1	1	.	1	1	1	1	1	1	1	1
108	2	2	2	1	1	1	1	1	1	.	.	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
73	2	.	.	.	UHM	3	3	2	1	BC2	17
74	1	1	.	.	UHM	3	3	2	1	BC2	19
75	1	.	.	.	UHM	3	3	2	1	BC2	20
76	.	.	.	.	UHM	3	3	2	5	BC2	21
77	1	.	.	.	UHM	3	3	1	2	BC2	22
78	.	.	.	.	UHM	3	3	2	7	BC2	23
79	1	.	.	.	UHM	3	3	1	1	BC2	24
80	.	.	.	.	UHM	3	3	1	2	BC2	25
81	1	.	.	.	UHM	3	3	2	5	BC2	26
82	1	.	.	.	UHM	3	3	2	1	BC2	27
83	.	.	.	.	UHM	3	3	2	1	BC2	28
84	1	4	.	.	UHM	3	3	2	1	BC2	29
85	.	.	.	.	UHM	3	3	2	1	BC2	30
86	1	.	.	.	UHM	3	3	1	2	BC2	31
87	.	.	.	.	UHM	3	3	1	2	BC2	32
88	1	.	.	.	UHM	3	3	2	1	BC2	33
89	1	4	.	.	UHM	3	3	2	1	BC2	34
90	1	1	.	.	UHM	3	3	1	2	BC2	35
91	.	.	.	.	UHM	3	3	1	2	BC2	36
92	.	.	.	.	UHM	3	3	3	7	BC2	37
93	.	.	.	.	UHM	3	3	1	5	BC2	38
94	.	.	.	.	UHM	3	3	1	1	BC2	39
95	2	.	.	.	UHM	3	3	1	2	BC2	40
96	.	.	.	.	UHM	3	3	2	1	BC2	41
97	.	.	.	.	UHM	3	3	1	2	BC2	42
98	.	.	.	.	UHM	3	3	1	6	BC2	43
99	2	.	.	.	UHM	3	3	2	5	BC2	44
100	.	.	.	.	UHM	3	3	2	5	BC2	44B
101	1	.	.	.	UHM	3	3	1	2	BC2	45
102	1	.	.	.	UHM	3	3	2	2	BC2	46
103	1	3	.	.	UHM	3	3	1	2	BC2	47
104	1	.	.	.	UHM	3	3	2	6	BC2	48
105	.	.	.	.	UHM	3	3	1	1	BC2	49
106	.	.	.	.	UHM	3	3	1	2	BC2	49A
107	.	.	.	.	UHM	3	3	1	1	BC2	50
108	1	1	.	.	UHM	3	3	1	2	BC2	51

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
109	1	1	.	1	.	1	.	1	.	.	.	.	.	1
110	.	1	.	.	.	.	.	.	.	.	.	.	.	1
111	.	.	.	1	1	1	.	1	7	.	.	.	.	1
112	.	7	.	8	8	1	1	7	7	1	1	1	1	1
113	.	.	.	7	2	1	.	7	.	.	.	.	.	2
114	.	.	.	5	2	1	.	.	.	.	.	1	.	5
115	.	.	.	.	.	7	7	.	.	.	.	.	.	7
116	.	.	.	8	1	1	1	7	7	.	1	.	1	9
117	.	.	.	.	1	.	.	.	.	.	.	.	.	.
118	.	.	.	.	.	.	.	7	.	.	.	.	.	8
119	.	.	.	4	4	1	.	7	.	.	.	.	.	8
120	.	.	.	1	1	1	1	1	1	.	.	.	.	1
121	.	.	.	1	1	1	1	1	1	.	.	.	.	1
122	.	1	1	.	1	.	1	7	7	.	.	.	1	9
123	.	.	.	.	.	.	1	.	1	.	.	.	.	1
124	.	.	.	1	.	.	1	.	1	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	7	.	.	1	1	.	.	7	7	.	.	.	.	2
127	.	.	.	1	1	1	1	7	7	.	.	.	.	1
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	1	1	.	1	1	1	1	7	7	1	1	1	1	1
130	1	1	.	1	1	1	1	7	7	1	1	1	1	1
131	.	.	.	.	.	.	.	7	.	.	.	.	.	1
132	.	.	.	5	4	.	.	.	.	.	.	.	.	.
133	.	7	.	1	1	1	1	7	7	.	.	.	1	1
134	.	.	.	1	.	1	.	1	.	.	.	.	.	1
135	.	.	.	.	.	.	.	.	.	.	.	.	.	4
136	.	.	.	.	.	1	.	7	.	.	.	.	.	7
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
109	.	1	1	1	1	1	1	1	1	1	.	1	1
110	.	1	3	1	.	.	.	7	.	.	.	7	.
111	1	1	1	1	1	7	1	7	1	7	.	1	1
112	1	1	1	1	1	7	7	.	.	.	.	2	2
113	2	9	9	8	1	7	7	7	7	.	.	1	1
114	5	.	4	5	8	.	7	.	.	.	.	3	2
115	7	.	.	.	.	.	.	.	.	.	.	7	7
116	1	1	1	1	1	1	1	1	1	1	.	2	8
117	.	1	.	3	.	7	7	7	1	1	1	.	7
118	.	.	1	.	.	.	.	.	.	.	.	.	.
119	1	2	4	3	1	1	1	1	.	1	.	1	1
120	1	1	1	1	8	1	7	1	1	1	.	3	1
121	1	.	1	6	3	1	1	.	.	.	.	1	1
122	1	1	6	1	9	7	.	1	1	1	1	1	1
123	4	1	5	1	2	1	7	.	.	.	.	1	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.
126	2	4	2	7	3	.	7	7	1	1	.	1	1
127	1	.	3	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.
129	1	1	1	1	1	1	1	1	1	1	1	1	1
130	4	.	.	.	.	.	.	.	.	.	.	.	.
131	3	.	.	7	.	.	.	.	.	.	.	.	.
132	7	.	.	.	.	.	.	.	.	.	.	.	.
133	1	1	1	1	1	1	1	1	1	.	1	1	1
134	1	1	1	1	1	1	.	1	.	1	.	1	1
135	.	1	.	8	.	.	.	.	.	.	.	.	.
136	8	2	.	2	.	7	7	1	.	.	.	3	1
137	.	.	.	.	2	.	.	.	.	.	.	.	2
138	8	.	.	.	1	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	7	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
109	.	.	.	.	.	.	.	.	.	.	1	.	1	.
110	.	.	.	.	.	.	.	.	.	.	.	.	1	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.	1
112	.	.	.	.	.	.	.	.	.	.	2	4	1	4
113	1	.	1	1	1	1	1	.	.	.	1	1	1	8
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	1	.	1	.	1	1	.	1	1	.	1	3	1	1
117	.	.	.	.	.	.	.	.	.	.	1	.	1	.
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	.	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	1	.
121	.	.	.	.	.	.	.	.	.	.	.	1	.	1
122	.	.	1	.	1	1	.	1	1	1	1	1	1	1
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	1	.	1	1	1	.	1	.	.	.	1	.	1	.
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	1	.	.	.	.	.	.	.	.	.	.	.	.
129	1	.	.	.	.	.	.	.	.	.	.	1	1	1
130	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	.	.	1	1	1	.	.	.	.	.	1	1	1	1
134	.	.	.	.	.	.	.	.	.	.	.	.	1	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
109	.	.	.	.	.	.	.	.	.	.	1	1	1
110	.	.	.	.	.	.	2	.	.	.	.	.	.
111	.	1	.	2	.	2	2	.	.	.	.	.	.
112	1	1	.	2	.	2	4	4	.	.	1	1	1
113	1	1	1	1	1	8	10	8	.	.	1	.	1
114	.	.	.	.	.	.	.	1	.	.	1	.	7
115	.	.	.	.	.	.	.	.	.	.	.	.	.
116	1	1	1	1	8	1	10	5	.	.	1	1	7
117	1	.	.	.	.	.	.	.	.	.	.	.	.
118	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	.	.	.	.	.	.	1	.	.
120	1	1	1	.	.	.	4	1	.	.	.	.	.
121	.	1	.	1	.	1	2	5	.	.	.	.	.
122	1	1	1	1	1	1	11	9	.	.	1	7	7
123	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.
126	1	3	.	3	.	.	3	.	.	.	.	.	.
127	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	1	2	.	.	.	1	1
129	1	1	1	1	3	.	.	2	.	.	1	1	1
130	.	.	.	1	.	.	.	.	.	.	.	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.
133	1	1	1	1	1	1	3	6	.	.	1	1	1
134	1	.	.	.	.	.	3	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	.	.
136	.	.	.	.	.	.	.	.	.	.	.	1	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
109	1	.	.	.	.	.	.	.	.	.	.	.	1
110	.	.	.	.	.	.	.	.	.	1	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	.
112	7	1	1	1	1	1	1	1	1	.	1	1	1
113	.	1	1	1	1	1	1	1	1	1	1	1	1
114	.	1	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.
116	1	1	1	1	1	1	1	1	1	1	1	1	1
117	.	.	.	.	.	.	.	.	.	.	.	.	1
118	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	1	.
122	1	7	1	1	1	1	1	1	1	1	1	1	1
123	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.
126	.	.	.	.	.	.	.	.	.	7	.	.	1
127	.	.	.	.	.	.	.	.	.	.	.	.	.
128	1	.	1	.	1	1	1	.	1	.	1	1	1
129	1	1	1	.	.	1	.	1	.	1	1	1	.
130	.	1	.	.	1	1	1	1	1	1	1	1	1
131	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.
133	1	1	1	1	.	1	1	1	.	1	1	1	1
134	.	.	.	.	.	.	.	.	.	.	.	1	1
135	.	.	.	.	.	.	.	.	.	.	.	.	.
136	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
109	.	1	1	1	1	1	1	.	.	.	.	.	1	1	1	1
110	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
111	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3	3
112	1	1	1	1	1	1	1	1	4	4	.	.	1	1	1	1
113	1	1	1	1	1	1	1	1	6	5	.	.	.	.	.	.
114	.	.	3	.	3	.	3	.	.	.	.	.	.	.	.	2
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
116	1	1	1	.	8	1	1	1	5	5	.	.	1	1	1	5
117	.	1	.	1	.	.	.	.	.	.	.	.	1	.	3	3
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	5
121	1	.	.	.	.	.	.	.	.	.	.	.	3	3	3	3
122	1	1	1	1	1	1	1	8	6	7	.	.	5	1	5	1
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	8	1	8	1	8	.	3	1	1	.	.	.	.	.	.	.
127	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3	3
128	.	1	.	1	.	1	.	1	.	5	.	.	.	.	.	.
129	1	.	1	3	1	1	.	1	1	.	.	.	1	1	1	1
130	.	1	.	1	1	1	.	1	10	11	.	.	1	1	.	.
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	1	1	1	1	1	1	1	1	3	5	.	.	.	4	2	5
134	1	1	.	.	.	.	.	.	.	.	.	.	3	3	5	5
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
136	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
109	1	1	1	.	5	5	5	5	5	5	5	.	.	.	.	.	3	3	2	2	.	.	7	.	.
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
111	3	3	3	5	5	5	5	5	5	5	5	5	3	3	.	.	.	.	.	.	.	.	3	.	1
112	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	7	.	3
113	.	.	3	3	.	.	.	3	3	3	3	3	3	3	3	.	3	3	5	5	5	.	3	.	.
114	5	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	7	.	.	.	.	7	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	5	1	5	5	5	3	3	5	5	5	5	5	5	5	5	.	5	5	5	5	3	.	2	.	3
117	3	.	.	3	3	3	3	3	3	.	.	.	.	.	.	.	3	3	3	.	.	.	.	.	3
118	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
119	.	.	.	.	.	.	.	.	.	.	5	5	5	.	.	.	5	5	5	5	.	.	2	.	1
120	3	3	3	5	5	5	5	5	5	5	5	5	5	3	.	.	5	5	5	5	5	.	2	.	.
121	3	3	3	5	5	5	5	5	5	5	5	5	5	3	3	.	5	5	2	.	.	.	.	.	2
122	4	.	.	.	.	.	.	.	.	.	.	.	5	5	.	.	.	.	5	5	2	.	.	.	1
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	3	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	.	.	1	1	3	5	2	5	5	1	1	5	1	1	1	.	1	1	1	1	1	.	1	.	5
127	3	3	.	3	3	3	3	3	3	3	3	5	5	5	.	.	5	5	5	5	3	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	1	.	1
130	.	.	1	1	1	5	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	1
131	.	.	.	.	.	.	.	5	3	3	3	3	5	5	5	.	1	.	.	.	.	.	.	.	2
132	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	5	.	5	1	1	1	1	1	1	1	1	1	1	1	.	.	.	1	1	1	1	.	1	.	1
134	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
135	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	1	.	1	.	.
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	3	3	.	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
109	2	2	2	2	2	2	2	2	2	.	2	.	2	.	2
110	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
111	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
112	3	5	2	5	2	5	3	5	3	5	3	2	5	3	5
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	.	.	.	.	.	2	2	2	2	.	.	.	.	.	.
115	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.
116	5	5	5	5	5	5	3	5	5	5	2	2	2	2	2
117	3	3	3	3	3	3	3	.	3	.	3	.	3	.	3
118	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.
119	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.
120	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
121	.	2	2	2	2	2	2	2	2	2	2	2	2	2	2
122	.	5	.	1	.	3	.	6	3	3	3	.	4	.	.
123	.	2	2	2	2	2	2	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	5	2	2	2	2	2	2	2	3	5	3	2	.	2	.
127	2	3	2	3	2	3	3	3	3	3	3	3	3	3	3
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	1	2	3	2	3	5	5	1	5	3	5	5	5	5	5
130	1	2	.	.	.	5	1	2	5	2	5	5	5	3	5
131	.	.	.	5	.	5	.	5	.	5	.	5	2	5	3
132	.	.	.	.	.	.	8	.	8	.	8	.	.	.	.
133	1	.	2	5	5	5	2	1	5	5	5	2	5	5	5
134	.	1	1	1	1	1	1	.	.	.	.	.	.	.	.
135	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	.	.	.	.	.	.	8	.	8	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
109	.	.	.	.	.	.	.	.	.	.	1	2	2
110	.	.	.	.	.	.	.	.	.	.	2	.	2
111	1	1	1	1	1	1	.	.	.	.	1	1	2
112	3	3	3	1	3	1	.	1	.	.	1	1	1
113	.	.	.	.	.	.	.	.	.	.	1	1	2
114	.	.	.	.	.	.	.	.	.	.	.	.	2
115	.	.	.	.	.	.	.	.	.	.	.	.	.
116	2	2	2	2	.	2	2	2	.	.	1	1	1
117	.	.	.	.	.	.	.	.	.	.	.	.	.
118	.	.	.	.	.	.	.	.	.	.	1	1	.
119	.	.	.	.	.	.	.	.	.	.	2	2	2
120	2	2	2	2	2	2	2	.	.	.	2	2	.
121	2	2	2	2	.	.	.	.	.	.	2	.	.
122	.	.	.	.	.	.	.	.	.	.	2	2	2
123	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	.	.	.	.	.	.	.	.	.	2	1	2
125	.	.	.	.	.	.	.	.	.	.	2	.	.
126	2	.	2	.	.	.	.	.	.	.	.	.	.
127	.	.	.	.	.	.	.	.	.	.	2	2	2
128	.	.	.	.	.	.	.	.	.	.	.	.	.
129	5	5	5	5	5	1	.	1	.	.	1	1	1
130	1	5	1	5	.	3	.	.	.	.	2	2	2
131	2	.	.	.	1	2	.	1	.	.	.	.	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.
133	1	5	1	5	1	.	.	.	.	.	2	2	1
134	.	.	.	.	.	.	.	.	.	.	.	2	.
135	.	.	.	.	2	.	.	.	.	.	.	.	.
136	.	.	.	.	.	.	.	.	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	2
138	.	.	.	.	.	.	.	.	.	.	2	2	2
139	.	.	.	.	.	.	1	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	2	2	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
109	2	1	1	1	1	1	1	1	1	1	1	1	1	1
110	.	.	.	.	.	.	.	.	.	.	.	.	.	.
111	2	2	2	2	2	1	1	2	2	2	2	1	1	1
112	1	1	1	1	1	1	1	1	1	1	1	1	1	1
113	1	1	1	1	1	1	1	.	.	.	.	1	1	2
114	.	2	.	2	.	.	.	.	2	.	.	1	.	.
115	.	2	.	.	.	.	.	.	.	.	.	.	.	2
116	1	2	2	1	1	1	1	1	1	2	2	1	1	1
117	2	.	.	.	.	1	.	.	.	.	.	.	.	2
118	.	.	.	1	.	1	1	.	2	.	.	.	.	.
119	2	2	2	2	2	2	.	2	2	2	.	1	1	2
120	.	2	2	.	2	.	.	.	.	.	.	1	1	1
121	.	.	2	2	2	.	.	.	.	.	.	1	1	1
122	2	1	1	2	1	1	1	1	1	.	.	1	1	1
123	.	.	2	2	2	.	.	.	.	.	.	.	.	2
124	.	2	2	2	.	.	.	.	.	.	.	1	.	.
125	.	.	.	1	.	1	.	.	.	.	.	1	.	.
126	.	.	.	.	.	.	.	.	.	.	.	.	.	.
127	2	2	2	1	1	1	1	2	2	.	.	1	1	2
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	1	1	1	1	1	1	1	2	2	2	2	1	1	1
130	2	1	1	.	1	.	.	.	.	.	1	.	1	1
131	.	.	.	.	.	.	.	.	.	.	.	.	.	.
132	.	2	2	.	.	.	.	.	.	.	.	.	.	2
133	1	2	2	1	1	1	1	2	2	2	2	1	1	2
134	.	2	2	.	.	.	.	2	2	.	.	.	.	1
135	.	.	.	.	.	.	.	.	.	.	.	.	.	.
136	.	.	.	1	1	1	1	1	1	.	.	.	.	.
137	.	.	.	.	.	.	.	.	.	.	.	.	.	.
138	2	2	2	.	2	.	1	2	.	.	.	.	1	1
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	2	.	.	1	1	1	1	1	1	.	.	1	1	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR BAN CHIANG

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
109	1	.	.	.	UHM	3	3	1	5	BC2	52
110	.	.	.	.	UHM	3	3	1	7	BC2	53
111	1	.	.	.	UHM	3	3	2	5	BC2	54
112	1	.	.	.	UHM	3	3	1	4	BC2	55
113	2	.	.	.	UHM	3	3	1	2	BC2	56
114	2	.	.	.	UHM	3	3	2	2	BC2	57
115	2	.	.	.	UHM	3	3	3	1	BC2	58
116	1	.	.	.	UHM	3	3	2	2	BC2	59
117	.	.	.	.	UHM	3	3	1	6	BC2	60
118	.	.	.	.	UHM	3	3	2	2	BC2	61
119	2	.	.	.	UHM	3	3	2	5	BC2	62
120	1	.	.	.	UHM	3	3	1	6	BC2	63
121	.	.	.	.	UHM	3	3	2	6	BC2	64
122	1	3	.	.	UHM	3	3	1	2	BC2	65
123	.	.	.	.	UHM	3	3	2	6	BC2	66
124	.	.	.	.	UHM	3	3	3	5	BC2	67
125	.	.	.	.	UHM	3	3	1	7	BC2	68
126	.	.	.	.	UHM	3	3	2	1	BC2	69
127	1	.	.	.	UHM	3	3	1	5	BC2	70
128	.	.	.	.	UHM	3	3	1	1	BC2	71
129	1	.	.	.	UHM	3	3	1	1	BC2	72
130	1	4	.	.	UHM	3	3	1	1	BC2	73
131	.	.	.	.	UHM	3	3	2	1	BC2	75
132	2	.	.	.	UHM	3	3	1	3	BC2	74
133	2	.	.	.	UHM	3	3	1	1	BC2	76
134	1	.	.	.	UHM	3	3	2	6	BC2	77
135	.	.	.	.	UHM	3	3	1	2	BC2	78
136	1	.	.	.	UHM	3	3	2	2	BC2	79
137	.	.	.	.	UHM	3	3	3	4	BC2	79B
138	1	.	.	.	UHM	3	3	2	5	BC2	80
139	.	.	.	.	UHM	3	3	2	7	BC2	81
140	1	.	.	.	UHM	3	3	1	2	BC2	386

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
1	.	.	.	8	7	.	1	.	7	.	7	.	.	2
2	7	.	.	.	.	.	.	.	.	.	7	.	.	.
3	.	.	.	.	3	.	.	.	7	.	.	.	.	1
4	.	.	.	.	4	.	.	.	.	.	7	.	.	4
5	.	.	.	7	7	7	.	7	7	1	1	.	.	2
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	1	.	.	.	.	.	.	.
8	.	.	.	.	.	1	1	7	.	7	.	.	.	8
9	.	.	.	1	.	1	1	7	7	1	7	1	1	9
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	7
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	7	.	8	8	.	.	7	.	7	.	.	.	2
18	.	.	.	.	.	.	.	.	.	.	.	.	.	1
19	.	.	.	.	1	.	1	.	7	.	7	.	.	.
20	1	3	.	1	7	1	1	7	7	.	.	.	.	8
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	1	1	1	1	7	7	7	7	.	.	1
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	9	8	.	1	7	7	.	.	.	.	2
26	.	.	.	2	.	.	.	.	.	.	.	.	.	1
27	7	7	.	7	1	1	.	7	.	.	.	.	.	1
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	3	1	.	1	.	.	.	1	.	.	1
30	.	2	.	8	9	1	1	2	2	.	1	1	1	1
31	.	.	.	.	4	.	.	.	.	.	.	.	.	.
32	.	.	.	2	.	1	.	7	.	7	.	.	.	1
33	.	.	.	.	.	.	.	.	.	.	.	.	.	9
34	.	.	.	1	.	1	2	.	.	1	2	1	.	9
35	.	.	.	.	3	.	.	.	.	.	.	.	.	4
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
1	.	2	2	8	8	7	7	7	7	.	.	2	2
2	4	4	8	6	6	7	7	7	7	.	.	8	8
3	2	5	8	8	8	.	.	.	.	.	.	7	.
4	2	3	8	3	8	1	.	7	7	1	.	8	2
5	9	9	1	.	1	1	1	.	.	.	1	2	8
6	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	3	.	3	.	.	.	.	.	.	.	5
8	8	.	.	.	.	.	.	.	.	.	.	9	1
9	1	4	1	1	6	1	1	7	7	.	.	1	1
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	2	.	.	.	.	.	.	1	.	.	9	9
12	.	.	.	.	4	.	.	.	.	.	.	5	5
13	.	.	.	3	.	.	7	.	7	.	.	8	8
14	.	.	.	.	.	.	.	7	.	.	.	5	.
15	.	.	.	3	.	7	7	7	7	.	.	8	8
16	.	.	.	.	.	.	.	.	.	.	.	.	.
17	2	1	1	8	8	7	7	7	7	.	.	3	8
18	.	.	.	.	.	.	.	.	.	.	.	.	.
19	9	3	2	8	8	1	1	1	1	.	.	8	1
20	1	8	8	1	3	7	7	1	1	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	8	.
22	.	.	.	.	.	.	.	.	.	.	.	.	5
23	1	7	7	7	7	7	.	7	7	.	.	1	1
24	.	.	.	.	.	.	.	.	.	.	.	4	.
25	2	1	8	8	8	1	1	1	1	.	7	8	1
26	.	.	.	.	.	.	.	1	.	.	.	.	.
27	2	1	2	1	1	.	.	7	.	.	.	8	3
28	.	.	.	.	.	.	.	.	.	.	.	.	.
29	2	4	1	1	.	1	1	1	2	.	.	1	1
30	1	4	1	1	1	1	1	2	2	1	2	1	1
31	2	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	3
33	.	.	.	5	.	.	.	.	.	.	.	.	.
34	9	1	.	1	1	1	2	2	2	1	.	8	9
35	2	9	8	5	5	.	.	.	.	.	.	7	2
36	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
1	.	.	.	.	.	.	.	1	.	1	1	.
2	.	.	2	2	2	2	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	2	.	.	.	.	.	.	.	.	.
5	.	.	1	9	9	8	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.
7	1	.	2	9	1	6	.	.	.	.	.	.
8	1	1	1	1	1	1	.	.	.	.	.	.
9	.	1	1	1	9	1	.	1	.	1	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	1	1	7	7	.	.	.	.	.	.
12	.	1	5	5	2	2	.	.	.	.	.	.
13	.	.	2	5	.	5	.	7	.	.	.	.
14	.	.	2	.	.	.	.	.	.	.	.	.
15	.	.	.	5	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.
17	1	.	2	2	2	2	.	.	.	1	.	1
18	.	.	.	.	.	.	.	.	.	.	.	.
19	.	.	1	1	7	1	.	1	.	.	1	1
20	.	.	.	.	.	.	1	.	.	.	.	.
21	.	.	.	5	.	.	.	.	.	.	.	.
22	.	.	7	5	.	7	.	.	.	.	.	.
23	.	.	3	3	.	3	.	1	.	.	.	.
24	.	.	2	2	9	9	.	.	.	.	.	.
25	1	1	2	1	1	7	1	.	1	1	1	.
26	.	.	.	.	.	.	.	.	.	.	.	.
27	.	.	1	4	7	.	.	1	.	.	.	1
28	.	.	.	.	.	.	.	.	.	.	.	.
29	1	.	2	8	8	1	.	.	.	.	.	.
30	.	1	1	1	1	1	.	.	.	1	.	.
31	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.
33	1	.	2	2	7	2	.	.	.	.	.	.
34	.	.	9	9	9	9	.	.	1	1	.	1
35	.	7	9	2	4	2	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
1	.	.	1	1	1	1	1	1	.	.	1	1	5	8
2	.	.	.	.	.	.	.	.	.	.	4	4	1	4
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.	1	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	3
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	1	.	.
9	.	.	1	1	.	1	.	.	.	1	.	1	.	1
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	1	.	.	.	.	.	.	.	.	1	.
13	.	.	1	.	.	.	.	.	.	.	.	.	.	3
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	1	.	1	.	.	.	.	.	.	.	1	.	1
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	.	.	1	1	.	.	.	.	.	.	1	1	1	1
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	1	.	.	.	.	1	.	1	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	1	.	1	.	.	.	.	.	7	1	1	1
26	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	.	1	.	.	.	1	.	1	.	.	.	.	3	1
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	1	.	.	.	.	.	.	.	.	1	1	8	1
30	.	.	.	1	.	1	.	1	.	.	1	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	1	1	1	1	1	1	.	.	.	.	.	1	1	1
35	.	.	.	.	.	.	.	.	.	.	.	.	3	2
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
1	1	1	8	8	.	8	4	9	.	.	.	.	.
2	1	.	4	.	4	.	2	2	.	.	1	1	4
3	.	.	.	4	3	1	.	1	.	.	.	.	.
4	.	.	.	.	.	.	6	.	.	.	.	.	.
5	.	.	.	.	.	.	.	3	.	.	1	1	1
6	.	.	.	.	.	.	.	3	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	1	1	3
8	.	.	1	.	1	1	1	5	.	.	.	1	7
9	1	1	1	1	1	.	3	10	.	.	1	1	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	1	3	4	.	.	.	5	.	.	1	1	7
13	.	4	.	.	.	.	.	.	.	.	.	3	.
14	.	.	.	.	.	.	.	.	.	.	1	1	7
15	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	1	1	1	.	1	4	12	.	.	3	7	3
18	.	.	.	.	.	.	.	.	.	.	.	.	.
19	1	1	.	1	.	1	3	11	.	.	1	.	1
20	.	.	2	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.
23	1	.	3	.	.	.	8	4	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	1	.	.
25	1	1	1	1	3	1	.	10	.	.	1	1	4
26	.	.	.	.	.	.	.	.	.	.	.	.	.
27	3	.	3	.	4	.	3	3	.	.	1	1	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.
29	4	1	.	4	.	.	2	5	.	.	.	.	.
30	1	1	1	1	.	1	2	8	.	.	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	4	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	1	1	1	1	1	1	6	11	.	.	1	1	1
35	.	.	.	.	.	.	1	.	.	.	1	1	1
36	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
1	3	.	.	.	.	.	.	.	.	.	.	.	.
2	4	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	1	1	.	.	.	.	.	.	.	.	1	1
6	.	.	.	.	.	.	.	.	.	.	.	.	.
7	3	.	.	.	.	.	.	.	.	.	.	1	1
8	7	.	.	.	.	.	.	.	.	.	.	.	.
9	1	.	1	.	1	.	.	.	.	.	.	1	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.
12	7	.	.	1	.	.	.	.	1	.	1	.	.
13	7	.	.	7	7	7	7	.	.	7	.	3	.
14	7	7	.	1	7	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	1	.	1	.	1	.	1	.	1	.	1	7
18	.	.	.	.	.	.	.	.	.	.	.	.	.
19	1	1	1	1	1	1	.	1	1	1	.	1	1
20	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1
26	.	.	.	.	.	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.
30	1	1	1	1	1	1	1	1	1	.	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	2	1	.	2	.	1	1	1	1	1	1	1	1
35	1	1	1	.	1	1	1	1	.	1	.	1	3
36	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	3	3	3	3	3	.	2	.	.	3	1	.	1
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
5	.	8	.	1	.	3	.	3	.	.	.	.	.	1	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	8	8	3	7	1	.	3	3	2	3	.	.	.	.	.	.
8	.	3	.	3	.	.	.	.	.	1	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	1	.	.	.	3	1	5	5
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	3	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	1	2	1	.	1	.	1	.	8	.	.	.	3	5	3	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	1	1	1	1	1	1	1	1	4	5	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.	.	.	.	1	1	5	5
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
24	3	8	3	8	.	1	.	.	.	6	.	.	.	.	.	.
25	1	1	1	1	1	1	1	1	1	5	.	.	3	2	.	.
26	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	3
27	1	.	2	.	.	.	3	3	.	.	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	1	1	1	1	1	1	1	3	6	6	.	.	3	1	1	1
31	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3
32	.	.	.	.	.	.	.	.	.	.	.	.	.	5	3	3
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	1	1	8	8	1	1	.	1	1	4	.	.	3	2	2	3
35	1	8	1	8	1	8	1	8	4	0	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
1	.	5	5	5	3	3	3	3	.	.	.	.	3	3	3	.	5	5	5	5	5	.	2	.	3
2	1	.	.	1	.	.	1	.	1	.	.	.	1	2	5	.	2	2	2	5	5	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
4	5	5	.	1	1	.	.	.	.	.	.	.	.	5	2	.	2	.	1	3	1	.	2	.	.
5	.	.	.	.	2	.	.	2	.	.	.	1	.	.	5	.	5	5	2	2	2	.	2	.	.
6	.	.	.	.	3	3	4	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	5	5	5	1	1	1	1	3	5	1	5	6	1	1	1	.	3	.	3	3	5	.	2	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	3	3	1	1	.	.	.	5	5	5	5	5	5	5	5	.	1	5	1	1	1	.	5	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	.	.	1	.	.	.	1	1	1	1	1	5	5	1	2	.	2	1	1	1	1	.	1	.	.
20	5	5	5	1	1	1	1	5	5	5	.	5	5	.	.	.	5	5	.	.	.	.	.	.	2
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	5	1	5	1	.	.	5	2	3	1	3	3	5	5	5	2	1	2	2	5	5	.	5	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	5	5	3	3	5	3	5	.	5	2	1	3	5	.	5	.	.
26	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
27	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	5	2	2	2	.	5	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	1	.	.	.	.	.	.	1	1	1	1	1	.	5	2	1	1	1	.	2	.	5
30	1	1	5	3	2	5	5	2	2	2	5	3	3	2	2	.	3	5	3	5	5	.	2	.	3
31	2	2	.	2	3	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	3	.	.	.	.	5	5	5	5	5	5	5	5	3	2	.	5	5	5	5	5	.	2	1	3
35	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
1	.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	2	.	.	2	.	.	.	3	.	3
6	.	2	.	2	.	2	.	2	.	2	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	8	.	2	2	2	2	2	2	2	2	2	2	2	2	2
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	2	.	.	.	2	.	2	2	2	2	2	2	2	2
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	3	.	3	.	2	.	2	.	2	.	2	2	2	2	2
20	2	2	2	2	2	2	2	2	2	.	2	2	2	.	2
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	2	.	2	.	2	2	.	2
26	1	2	2	2	2	2	2	2	3	3	3	3	3	3	.
27	.	.	.	.	.	.	.	2	.	2	.	2	2	2	2
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	2	.	2	3	3	5	5	3	5	5	3	3	3
30	3	3	.	3	3	3	2	3	2	3	2	2	2	2	2
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	.	.	.	3	3	3	3	3	3	3	3	.	.	.	.
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	3	.	.	.	.	.	.	.	.	2	.	.	.	.	.
35	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
1	3	3	3	.	3	.	3	.	3	.	1	1	2
2	.	.	.	.	.	.	.	.	.	.	.	.	.
3	2	2	2	.	.	.	.	2	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	2	.	2	.	.	.	.	2	1	1
6	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.
9	2	2	2	2	.	.	.	.	.	.	2	.	1
10	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	2	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.	.	2	2	2
16	.	.	.	.	.	.	.	.	.	.	2	2	1
17	2	2	2	2	2	.	.	.	.	.	2	1	1
18	.	.	.	.	.	.	.	.	.	.	.	.	.
19	2	2	.	2	.	2	2	.	.	.	1	1	1
20	.	2	2	2	.	2	.	2	.	.	1	1	2
21	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	1	1	1
24	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	2	2	2	.	.	.	.	.	.	2	1	2
26	2	.	.	2	.	.	.	.	.	.	2	2	2
27	.	2	.	.	.	.	.	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	1	2
29	3	.	3	3	3	1	1	1	.	.	1	1	2
30	2	2	3	3	2	2	.	.	.	.	1	1	1
31	.	.	.	.	.	.	.	.	.	.	2	2	2
32	.	.	.	.	.	.	.	.	.	.	2	2	2
33	.	.	.	.	.	.	.	.	.	.	.	.	.
34	2	2	.	2	.	.	.	.	.	.	2	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
1	2	.	.	.	.	.	.	.	.	.	.	.	.	2
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	2	2	2	1	1	.	.	.	.	.	.	1	1	2
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9	2	1	1	1	.	.	.	2	.	.	.	1	.	1
10	.	.	.	.	.	.	.	.	.	.	.	.	.	1
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	1	2	1	2	2	.	.	.	.	.	.	1	1	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	2	2	2	2	2	2	.	.	.	.	.	1	1	2
16	1	2	2	2	2	.	.	2	2	.	.	.	.	.
17	1	1	1	1	1	.	2	2	2	.	.	1	1	1
18	.	2	2	.	.	.	.	.	.	.	.	.	.	.
19	1	1	1	.	1	1	1	1	1	1	1	1	1	.
20	2	2	2	1	2	.	.	2	2	.	.	1	1	1
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	1
23	1	1	1	1	1	2	2	2	2	.	.	1	1	2
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	2	2	2	2	2	2	2	1	1	.	.	1	1	2
26	2	2	2	2	2	2	2	2	2	.	.	1	1	.
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28	1	2	2	2	2	.	.	.	.	.	.	.	.	.
29	1	1	2	1	1	2	1	1	1	1	.	1	1	.
30	2	2	2	1	1	1	1	1	1	.	.	1	1	1
31	2	2	.	2	2	2	2	2	2	.	.	1	1	1
32	2	2	2	2	2	.	.	.	.	.	.	1	1	2
33	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	2	.	2	.	1	.	.	.	.	.	.	.	.	2
35	.	.	.	.	.	.	.	2	2	.	.	.	.	2
36	.	.	.	.	.	.	.	2	.	.	.	.	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
1	2	.	.	.	SIR	93	3	2	2	NNT	1 2
2	.	.	.	.	SIR	93	3	2	2	NNT	1 4
3	.	.	.	.	SIR	93	1	1	7	NNT	1 6
4	.	.	.	.	SIR	93	3	2	5	NNT	1 7
5	.	.	.	.	SIR	93	3	2	3	NNT	1 8
6	.	.	.	.	SIR	93	3	1	2	NNT	1 8A
7	.	.	.	.	SIR	93	3	2	7	NNT	1 9
8	.	.	.	.	SIR	93	3	1	7	NNT	1 10
9	1	.	.	.	SIR	93	3	1	2	NNT	1 12
10	1	.	.	.	SIR	93	3	1	1	NNT	1 12A
11	.	.	.	.	SIR	93	3	2	6	NNT	1 14
12	.	.	.	.	SIR	93	3	2	7	NNT	1 15
13	2	.	.	.	SIR	93	3	1	1	NNT	1 16
14	.	.	.	.	SIR	93	3	2	2	NNT	1 17
15	2	.	.	.	SIR	93	3	2	2	NNT	1 18
16	.	.	.	.	SIR	93	3	2	2	NNT	1 20
17	2	.	.	.	SIR	93	3	1	2	NNT	1 22
18	.	.	.	.	SIR	93	3	3	6	NNT	1 22A
19	.	.	.	.	SIR	93	3	2	1	NNT	1 23
20	1	3	.	.	SIR	93	3	2	2	NNT	1 24
21	.	.	.	.	SIR	93	3	1	7	NNT	1 25A
22	.	.	.	.	SIR	93	3	2	7	NNT	1 25B
23	2	.	.	.	SIR	93	3	1	1	NNT	1 26
24	.	.	.	.	SIR	93	3	2	7	NNT	1 27
25	2	.	.	.	SIR	93	3	2	1	NNT	1 28
26	.	.	.	.	SIR	93	3	2	5	NNT	1 29
27	.	.	.	.	SIR	93	3	2	1	NNT	1 30
28	.	.	.	.	SIR	93	3	1	2	NNT	1 30A
29	1	.	.	.	SIR	93	3	2	1	NNT	1 31
30	1	.	.	.	SIR	93	3	1	2	NNT	1 34
31	1	.	.	.	SIR	93	3	1	5	NNT	1 35
32	.	.	.	.	SIR	93	3	3	5	NNT	1 36
33	.	.	.	.	SIR	93	3	1	7	NNT	1 38
34	1	.	.	.	SIR	93	3	2	3	NNT	1 40
35	2	.	.	.	SIR	93	3	2	2	NNT	1 41
36	1	.	.	.	SIR	93	3	2	2	NNT	1 42

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
37	.	.	.	1	2	1	.	.	.	1	1	1	.	1
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	4	.	2	.	.	.	2	.	.	.	2
40	.	.	.	2	.	1	1	7	7	.	.	1	1	1
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	7	.	7	.	.	.	.	.	.	5
43	.	.	.	4	1	1	1	.	.	.	.	.	.	.
44	1	1	.	1	1	1	1	7	7	1	1	1	1	1
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	1	.	.	.	1	.	1	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	7	.	1	1	1	1	.	7	.	1	1	1	1
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	2	2	.	1	.	.	.	.	.	.	4
54	.	.	.	.	.	.	.	.	.	.	.	.	.	1
55	7	7	.	3	7	1	.	.	.	7	7	1	.	2
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.
58	.	.	.	1	1	1	1	7	7	1	1	1	1	1
59	.	.	.	.	.	.	.	.	.	.	.	.	.	9
60	1	7	.	2	1	1	1	.	7	.	.	1	1	9
61	.	7	.	1	1	7	7	.	.	.	.	1	1	1
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.	.	4
65	.	.	.	1	1	1	1	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	7	.	1	4	1	1	.	.	.	.	.	.	1
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	5	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	7	.	.	.	.	.	.	.	.	.	7
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	2	.	1	1	2	.	.	.	.	.	4

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SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
37	1	8	1	9	.	1	1	7	7	.	1	8	1
38	.	.	.	.	.	.	.	.	7	.	.	.	.
39	4	.	3	3	1	.	.	.	.	.	.	.	3
40	1	8	1	8	8	1	7	7	7	7	7	8	8
41	.	.	.	.	.	.	.	.	.	.	.	2	.
42	2	7	2	7	7	7	.	.	.	.	.	2	2
43	1	.	8	.	8	.	.	.	.	.	.	.	.
44	1	1	1	1	1	1	1	1	1	1	1	1	1
45	.	.	.	.	7	.	1	.	1	.	.	.	8
46	6	.	1	.	9	1	.	1	.	.	1	3	3
47	.	.	7	.	.	7	7	.	.	.	.	2	2
48	.	.	.	.	.	.	.	.	.	.	.	5	2
49	.	.	.	.	.	.	.	.	.	.	.	3	3
50	3	.	1	.	1	1	1	1	1	.	.	2	2
51	1	9	8	1	8	1	1	.	1	.	.	1	1
52	.	.	.	.	.	.	.	.	.	.	.	4	.
53	9	5	3	2	8	1	1	1	1	1	.	8	1
54	.	3	.	3	.	1	1	.	1	.	.	1	2
55	1	3	7	3	3	.	.	.	.	.	.	2	2
56	.	.	.	.	.	.	.	.	.	.	.	.	.
57	7	.	4	2	9	.	1	7	1	.	1	.	1
58	6	3	8	3	1	7	.	7	1	.	.	1	1
59	4	5	.	1	.	.	.	.	.	.	.	8	8
60	9	.	8	.	8	.	.	.	.	.	.	.	.
61	1	1	1	8	8	.	1	1	1	.	.	1	1
62	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	7	.	.	.	5	.
64	.	2	1	9	9	.	7	1	1	.	.	2	1
65	.	.	.	.	.	.	.	.	.	.	.	.	.
66	5	.	.	.	.	.	.	.	.	.	.	.	.
67	1	1	8	1	8	1	1	1	1	.	.	1	1
68	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	8	.	8	.	.	1	1	.	1	1	8	3
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	2	2	2	2	.	.	3	.
72	4	2	3	2	1	7	7	7	7	.	.	2	8

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
37	.	.	.	.	.	.	.	1	1	1	1	.
38	.	.	.	.	.	.	.	.	.	.	.	.
39	1	.	1	1	1	8	.	.	.	.	.	.
40	.	.	7	.	3	1	.	1	1	.	.	.
41	7	7	5	.	6	.	.	.	.	.	.	.
42	.	.	2	3	.	8	.	.	.	.	.	.
43	.	1	.	.	.	.	.	.	.	.	.	.
44	1	1	1	1	1	1	.	1	1	.	.	.
45	.	1	.	5	.	3	.	1	.	1	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.
47	1	.	2	2	7	7	.	.	.	1	.	.
48	.	.	.	.	2	2	.	.	.	.	.	.
49	1	.	4	7	7	.	.	.	.	.	.	.
50	.	1	2	2	2	2	.	.	.	1	.	.
51	1	1	1	1	2	9	.	.	1	.	.	1
52	1	.	1	1	8	8	.	.	.	.	.	.
53	.	.	2	2	2	2	.	.	.	.	.	.
54	.	.	2	2	7	7	.	.	.	.	.	.
55	1	.	9	9	.	7	.	.	1	.	.	.
56	.	.	2	.	2	2	.	.	.	.	.	.
57	1	1	2	2	1	9	.	1	.	1	.	1
58	.	.	8	8	6	9	1	1	1	.	.	.
59	.	.	7	1	1	1	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.	.	.	.
61	.	1	2	2	4	1	.	.	1	1	.	1
62	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	7	.	.	.	.	.	.	.
64	.	1	9	1	.	6	1	.	1	1	1	.
65	.	.	.	.	.	.	.	.	.	.	.	.
66	.	7	.	.	.	.	.	.	.	.	.	.
67	1	1	1	1	1	1	.	.	.	.	.	.
68	.	.	.	.	.	.	.	.	.	.	.	.
69	7	.	.	.	7	7	.	.	.	.	.	1
70	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.
72	1	1	7	7	.	.	.	1	.	1	1	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
37	1	.	1	1	1	.	.	.	.	1	1	1	1	1
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.	.	1
40	.	.	.	.	.	.	.	.	.	.	.	1	.	2
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	2	.	2
43	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	1	1	.	.	.	.	.	.	1	1	1	8
45	.	.	.	1	.	.	.	.	.	.	.	1	.	1
46	.	.	.	1	.	1	.	.	.	.	.	1	.	1
47	.	1	.	1	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	3	.	3
50	.	.	1	.	.	.	.	.	.	.	.	1	1	1
51	1	.	1	.	.	.	.	.	.	.	1	8	1	1
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	1	.	.	.	.	.	.	.	1	.
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	1	1	.	.	.	.	.	.	1	.	1
58	.	.	1	.	1	.	.	.	.	.	1	.	.	.
59	.	.	.	.	.	.	.	.	.	.	.	1	.	2
60	.	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	1	.	1	1	.	.	.	.	1	1	.	.
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	1	1	1	.	1	.	.	.	.	.	.	1	1	1
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	.	.	.	.	.	.	.	.	.	1	1	3	4
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	.	.	1
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	1	1	.	.	.	1	.	.	1	.	4	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
37	1	1	4	4	1	1	5	10	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	1	1	1
40	.	.	.	.	.	.	6	.	.	.	7	1	.
41	.	.	.	.	.	.	.	.	.	.	7	7	7
42	.	2	.	2	.	2	3	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.
44	1	1	.	1	1	.	8	6	.	.	1	1	1
45	.	1	.	.	.	1	.	.	.	.	.	.	.
46	.	1	.	.	.	3	.	2	.	.	.	.	.
47	3	.	3	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	4	.	.	.	.	.	1	.	.	.	1	.
50	.	1	1	2	.	.	4	6	.	.	1	1	3
51	1	1	1	1	1	1	6	12	.	.	1	1	1
52	.	.	.	.	.	.	.	.	.	.	1	1	1
53	.	.	.	.	.	.	1	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	1	3	.	3	.	.	3	.	.	1	1	.
56	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	1	1	1	1	1	.	10	.	.	1	1	7
58	1	3	1	.	1	.	4	.	.	.	1	1	1
59	.	2	.	.	.	.	.	1	.	.	.	1	7
60	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	8	.	3	.	.	.	9	.	.	.	1	1
62	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.
64	8	1	4	2	3	3	5	9	.	.	1	1	.
65	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	4	3	.	.	1	.	8	.	.	1	1	1
68	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	1	.	3	.	.	.	.	.	.	.	7	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.
72	3	2	3	.	.	.	3	5	.	.	.	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
37	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.	.
39	1	1	1	1	1	1	1	1	.	1	1	1	1
40	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	.
44	7	1	1	1	1	1	.	1	1	1	1	1	1
45	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.
49	1	.	.	.	7	.	.	.	1	.	.	.	7
50	7	1	.	1	.	.	.	1	.	1	.	1	7
51	1	1	1	1	1	1	.	.	.	.	1	1	1
52	1	.	.	1	1	.	.	1	.	.	1	1	4
53	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	1	.	1
56	.	.	.	.	.	.	.	.	.	.	.	.	.
57	1	1	1	1	1	1	1	1	.	1	1	3	1
58	1	1	1	.	.	.	1	.	.	1	.	1	1
59	1	.	.	1	1	1	1	.	.	.	.	.	1
60	.	.	.	.	.	.	.	.	.	.	.	.	.
61	.	1	.	.	.	.	.	.	1	1	1	1	.
62	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.
64	1	1	1	1	.	1	1	.	1	1	.	1	1
65	.	.	.	.	.	.	.	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	.	1	.	1	1	.	1	.	1	.	1	1
68	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	1	.	.	.	.	1	.	.	.	.	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
37	.	.	.	.	.	.	.	.	.	.	.	.	3	2	3	3
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	1	1	1	1	1	1	1	1	6	6	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.	3	1	1	1
41	.	.	2	.	2	.	3	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
44	1	1	1	1	1	1	1	.	7	5	.	.	3	1	2	1
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	3	.	3	.	.	3	.	.	3	.	.	.	.	.	.
50	.	3	.	3	.	.	3	.	.	1	.	.	.	.	.	.
51	.	8	.	8	3	3	3	8	2	3	.	.	1	2	5	5
52	8	3	8	8	8	8	8	8	5	4	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.	3	5	3	3
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	3	3	.	.	3	.	3	.	1	.	.	3	5	5	5
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	1	1	1	1	8	8	8	1	3	5	.	.	.	.	.	.
58	1	1	2	.	1	1	3	1	3	4	.	.	.	.	.	5
59	.	8	3	3	3	.	3	.	.	5	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.	.	.	.	5	1	5	2
61	3	.	3	.	3	2	1	3	5	.	.	.	2	2	3	2
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	1	1	1	1	1	1	1	6	3	5	1	.	.	.	.	.
65	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	3	1	1	1	.	1	.	1	.	2	.	.	.	.	.	.
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	.	.	.	.	.	.	.	.	.	3	.	3	3

1353

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
37	3	3	.	.	.	.	3	3	3	3	5	5	5	5	5	.	5	5	1	1	1	.	2	.	.
38	2	.	2	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	2	3	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40	1	5	3	3	.	.	.	.	.	.	.	5	.	5	.	.	.	3	.	.	5	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
43	1	5	3	5	3	5	5	2	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44	1	1	3	1	1	1	1	1	1	1	2	2	1	1	1	.	1	1	1	1	2	.	2	.	.
45	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	2	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	5	5	5	.	2	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	.	5	5	.	2	.	.
51	5	2	5	5	5	2	5	5	5	5	5	5	5	5	5	.	3	3	3	5	1	.	5	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	3	3	3	3	3	3	3	3	3	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	2	.	.
55	5	5	5	.	.	2	2	2	2	2	3	3	2	2	2	.	2	2	2	2	2	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	5	5	2	.	5	.	.
58	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5	.	5	5	5	5	5	.	5	.	3
59	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
60	5	5	5	3	5	5	5	5	5	5	2	5	.	.	.	.	.	.	.	.	.	.	.	.	.
61	2	2	2	3	5	5	2	2	2	2	2	2	.	3	2	.	2	5	5	2	2	.	.	.	3
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	5	5	5	5	2	.	2	.	.
65	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	5
66	.	.	.	.	.	.	.	7	7	7	3	3	2	.	5	.	.	.	.	.	.	.	.	.	.
67	.	5	.	.	.	.	.	2	2	.	2	.	2	.	.	.	.	.	3	1	2	.	.	.	2
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	.	1	1	.	1	1	2	1	1	1	1	1	2	.	1	1	1	1	5	.	5	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	3	2	2	3	3	3	3	2	2	2	2	5	2	5	3	.	3	3	3	2	2	.	2	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
37	.	.	.	.	.	2	.	2	2	2	2	2	2	2	2
38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	2	.	2	.	2	.	2	.	2	.
40	.	2	.	2	.	2	2	2	2	2	2	2	2	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	3	.	3	.	3	.	3	3	3	3	2	.	3	.	3
44	2	.	2	2	2	2	2	2	2	2	2	2	2	2	2
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	2	2	2	2	2	2	2	2	2	2	2	2	.	2
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	2	2	2	2	2	2	2	2	2	2	.	.	.	.	.
54	.	.	.	.	3	3	3	3	3	.	3	3	3	3	3
55	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
58	.	2	2	2	3	2	3	2	2	2	2	2	3	2	3
59	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
60	3	.	2	2	2	2	2	2	2	2	2	2	2	2	.
61	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	2	.	2	2	2	3	2	2	2	2	2	.	2	.	2
68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	3	3	3	3	3	3	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	.	.	2	.	2	.	2	2	.	2	.	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
37	2	.	.	.	.	.	.	.	.	.	1	1	1
38	.	.	.	.	.	.	.	.	.	.	2	1	2
39	.	.	.	.	.	.	.	.	.	.	1	1	2
40	.	.	.	.	.	.	.	.	.	.	2	2	1
41	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	2	2	2
43	.	3	.	.	.	.	.	.	.	.	.	.	.
44	2	2	2	2	2	.	.	.	.	.	1	1	1
45	.	.	.	.	.	.	.	.	.	.	2	2	2
46	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	2	.	2	.	.	.	.	.	.	1	1	1
52	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	2	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	2	2	2
56	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	1	.	2
58	.	2	.	2	3	2	.	2	.	.	1	1	1
59	.	.	.	.	.	.	.	.	.	.	.	.	.
60	2	.	2	.	2	.	.	.	.	.	2	.	1
61	2	2	2	2	2	.	.	.	.	.	1	1	2
62	.	.	.	.	.	.	.	.	.	.	.	.	2
63	.	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.	.
65	5	5	.	.	.	.	.	.	.	.	2	.	1
66	.	.	.	.	.	.	.	.	.	.	.	.	.
67	2	2	2	2	2	2	.	2	.	.	1	1	1
68	.	.	.	.	.	.	.	.	.	.	.	2	.
69	.	.	.	.	.	.	1	1	.	.	2	.	.
70	.	.	.	.	.	.	.	.	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
37	1	1	1	1	1	1	1	1	1	1	1	1	1	1
38	2	.	2	.	1	.	2	.	.	.	.	1	1	.
39	.	2	2	.	.	.	.	.	.	.	.	.	.	.
40	1	2	2	1	.	1	.	1	2	.	.	1	.	2
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	2	2	2	2	2	2	.	2	.	.	.	1	1	2
43	.	2	2	2	2	1	.	1	2	.	.	1	1	1
44	1	1	1	1	1	2	2	1	1	1	.	1	1	1
45	2	2	2	2	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	1	1	1	1	1	1	1	1	1	1	1	1	1	1
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	2	2	2	2	.	.	.	2	.	.	1	1	2
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	1	2	2	1	1	2	2	2	2	1	1	1	1	1
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	2	1	1	1	.	1	.	1	.	2	.	1	.	.
58	1	1	1	1	1	2	1	1	1	2	2	1	1	1
59	.	.	.	.	.	.	.	.	.	.	.	.	.	.
60	2	2	2	1	1	2	.	1	1	.	.	1	1	2
61	2	2	2	2	2	2	2	1	1	.	.	1	1	1
62	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.	.	.
65	.	2	2	1	.	.	.	.	.	.	.	1	.	1
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	1	1	1	1	1	2	2	1	1	2	2	1	1	1
68	1	.	.	.	.	.	.	.	.	.	.	.	.	.
69	.	.	.	2	2	.	.	1	.	.	.	.	.	2
70	.	.	.	.	.	.	.	2	2	.	.	.	.	2
71	2	2	2	.	.	.	.	.	.	.	.	.	.	.
72	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
37	1	.	.	.	SIR	93	3	2	2	NNT	1 43
38	.	.	.	.	SIR	93	3	2	7	NNT	1 43A
39	.	.	.	.	SIR	93	3	2	2	NNT	1 44
40	1	.	.	.	SIR	93	3	1	5	NNT	1 44A
41	.	.	.	.	SIR	93	3	1	7	NNT	1 45
42	2	.	.	.	SIR	93	3	1	5	NNT	1 46
43	1	.	.	.	SIR	93	3	2	2	NNT	1 47
44	1	.	.	.	SIR	93	3	1	2	NNT	1 48
45	.	.	.	.	SIR	93	3	2	3	NNT	1 49
46	.	.	.	.	SIR	93	3	1	2	NNT	1 50
47	.	.	.	.	SIR	93	3	1	7	NNT	1 51
48	.	.	.	.	SIR	93	3	3	5	NNT	1 52
49	.	.	.	.	SIR	93	3	2	7	NNT	1 53
50	.	.	.	.	SIR	93	3	2	3	NNT	1 54
51	1	.	.	.	SIR	93	3	1	2	NNT	1 55
52	.	.	.	.	SIR	93	3	3	5	NNT	1 56
53	1	.	.	.	SIR	93	3	1	5	NNT	1 57
54	.	.	.	.	SIR	93	3	2	5	NNT	1 58
55	1	.	.	.	SIR	93	3	2	2	NNT	1 59
56	.	.	.	.	SIR	93	3	3	5	NNT	1 61
57	.	.	.	.	SIR	93	3	2	3	NNT	1 62
58	1	.	.	.	SIR	93	3	2	1	NNT	1 63
59	.	.	.	.	SIR	93	3	3	5	NNT	1 64
60	1	.	.	.	SIR	93	3	1	3	NNT	1 65
61	1	.	.	.	SIR	93	3	1	1	NNT	1 67
62	.	.	.	.	SIR	93	3	3	7	NNT	1 68
63	.	.	.	.	SIR	93	3	3	7	NNT	1 70
64	.	.	.	.	SIR	93	3	1	2	NNT	1 72
65	1	.	.	.	SIR	93	3	2	5	NNT	1 74
66	.	.	.	.	SIR	93	3	1	7	NNT	1 75
67	2	.	.	.	SIR	93	3	1	2	NNT	1 77
68	.	.	.	.	SIR	93	3	1	7	NNT	1 77I
69	2	.	.	.	SIR	93	3	1	2	NNT	1 78
70	2	.	.	.	SIR	93	3	1	5	NNT	1 79
71	.	.	.	.	SIR	93	3	1	2	NNT	1 80
72	.	.	.	.	SIR	93	3	1	3	NNT	1 81

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
73	.	.	.	.	.	.	.	.	.	.	.	.	.	1
74	.	.	.	.	.	.	.	.	.	.	.	.	.	7
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	1	.	2	.	.	.	.	.	9
80	.	.	.	2	2	.	.	7	7	7	7	1	.	4
81	.	.	.	1	3	.	1	.	7	.	.	1	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	4	5	1	.	.	.	1	.	1	.	2
84	.	.	.	.	4	.	1	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	8	.	1	.	.	.	7	.	1	.
89	.	.	.	1	1	1	1	7	7	1	1	1	1	1
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	2	2	1	1	.	.	.	.	.	.	.
93	.	.	.	.	.	1	.	.	.	.	.	.	.	3
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	.	.	.	2	2	7	.	7	7	.	.	.	.	2
100	.	7	.	2	9	1	1	7	7	.	7	.	.	8
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	1	4	.	1	1	1	1	.	.	7	7	.	1	1
104	3	.	.	.	.	.	.	.	.	.	.	.	.	9
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	4	.	1	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
73	.	.	.	.	.	.	.	.	.	.	.	8	.
74	.	.	.	.	.	.	.	.	.	.	.	5	.
75	.	2	5	2	8	1	.	1	.	.	1	8	8
76	.	.	.	.	.	.	.	.	.	.	.	5	2
77	.	.	.	.	.	.	.	.	.	.	.	.	5
78	5	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	2	3	.	.	.	.	7	.	.	.	3
80	9	9	2	8	8	7	7	7	7	.	.	3	8
81	2	1	1	3	8	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.
83	2	9	3	9	3	1	1	1	1	.	.	8	8
84	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	1	.	.	1	1	7	7	1	.	8	8	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.
89	1	1	1	8	1	1	1	1	1	1	.	9	1
90	.	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	.	.	.	.	.	1	.	.	.	2	4
92	1	4	1	4	1	.	1	.	.	.	.	4	4
93	8	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	3	.	1	.	1	.	.	3	3
95	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	8	.	1	.	1	7	7	7	.	.	2	2
99	.	3	.	3	.	.	.	.	.	.	.	.	.
100	2	3	1	3	2	.	.	7	1	.	.	8	8
101	.	.	.	.	.	.	.	.	.	.	.	.	.
102	2	.	8	.	2	.	.	.	.	.	.	3	8
103	3	8	4	8	4	1	1	7	1	1	1	8	5
104	9	4	1	.	5	1	7	7	7	.	.	8	1
105	4	.	4	.	.	.	.	.	.	.	.	2	2
106	3	1	3	.	3	.	.	7	1	.	.	.	4
107	.	.	.	.	.	.	.	.	.	.	.	2	2
108	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
73	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	2	.	.	.	.	.	.	.	.	.
75	3	3	9	2	2	2	1	.	1	.	1	1
76	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	2	7	.	.	.	.	.	.	.
78	.	.	4	4	4	4	.	.	.	.	.	.
79	.	.	.	4	4	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	1	.	1	.
81	.	.	.	.	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.
83	1	1	2	2	5	5	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.
85	5	2	2	9	5	.	.	.	.	.	.	.
86	.	.	1	1	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.
89	1	.	.	.	.	.	1	.	1	.	.	.
90	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	7	2	.	.	.	.	.	.	.	.
92	.	.	.	3	.	.	.	.	.	.	.	.
93	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	.	.	.	.	.	.	.	.
95	.	.	4	.	4	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.
98	1	1	3	2	5	5	1	.	1	1	.	.
99	.	.	.	.	.	.	.	.	.	.	.	.
100	.	.	.	.	2	.	.	.	.	.	.	.
101	.	.	3	1	3	2	.	.	.	.	.	.
102	1	1	2	.	2	2	.	.	.	.	.	.
103	.	.	9	9	9	9	.	.	1	.	.	.
104	1	1	1	1	9	2	.	.	.	.	.	.
105	.	.	.	5	.	.	.	.	.	.	.	.
106	.	.	9	1	8	8	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	9	.	2	.	.	.	.	.	.

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SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75	.	1	1	.	.	.	.	.	.	.	.	2	3	2
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	1	1	.	1	1	1	1	.	.	1	.	8	.
81	.	.	.	.	.	.	.	.	.	.	.	.	2	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	3	.	3
84	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	1	.	1	.	.	.	.	.	.	.	1	.	8	3
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	1	.	1	.	.	1	1	3	1
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	1	.	1	.	1	.	.	1	1	1	1
99	.	.	.	.	.	.	.	.	.	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	4	4	.	1
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	.	1	1	.	.	.	.	.	.	1	1	1	1
104	.	.	.	.	.	.	1	.	.	.	4	.	8	3
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
73	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.
75	3	1	.	3	.	3	5	10	.	.	1	1	1
76	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	1	1	7
79	.	.	.	.	.	.	.	.	.	.	.	.	.
80	1	.	1	1	1	1	11	2	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	4	.	.	.	.	.	1	.	.	1	1	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.
85	1	3	1	.	1	.	8	4	.	.	1	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.
89	1	1	1	1	1	1	8	7	.	.	.	.	.
90	.	.	.	.	.	.	1	.	.	.	.	.	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	.	.
93	.	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	.	.	1	.	.	.	.	.	.
95	.	.	.	.	.	.	.	.	.	.	1	.	1
96	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.
98	8	2	1	.	3	.	6	8	.	.	1	1	7
99	.	.	.	.	.	.	.	1	.	.	.	.	.
100	1	1	1	4	1	.	.	7	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	1	1	1
102	.	.	.	.	.	.	.	2	.	.	.	.	.
103	1	1	1	1	1	1	8	5	.	.	1	1	1
104	1	1	8	.	.	.	4	4	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	1	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
73	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.
75	7	1	.	1	1	1	.	1	.	.	.	3	1
76	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.
78	7	1	1	1	1	.	.	.	.	.	.	7	1
79	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.
89	.	.	.	.	.	.	.	.	.	.	.	.	.
90	.	1	.	.	1	.	.	1	.	.	.	1	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	.	1	.
93	.	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	.	.	.	.	.	.	.	.	.
95	1	1	1	.	1	1	1	.	.	.	1	1	1
96	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.
98	7	1	.	1	1	1	1	.	.	.	1	1	1
99	.	.	.	.	.	.	.	.	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	.	.
101	1	1	1	1	1	1	1	1	.	1	.	1	1
102	.	.	.	.	.	.	.	.	.	.	.	.	.
103	1	.	1	.	1	.	.	1	1	.	1	.	1
104	.	.	.	.	.	.	.	.	.	1	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.
106	1	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.
108	1	.	1	.	1	.	1	.	1	.	1	.	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75	4	.	4	.	.	.	3	3	1	.	.	.	3	.	.	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	8	2	3	.	3	.	3	.	.	.	.	.	.	.	.	.
79	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3	5
83	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	3	5	3	3
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	1	.	1	.	.	.	.	.	.	.	.	.	3	1	1	1
90	1	1	1	1	1	1	1	1	4	4	.	.	.	1	1	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
94	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	3
95	1	1	4	1	4	1	1	1	3	2	.	.	.	3	3	3
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2
98	1	8	1	8	8	1	1	1	5	4	.	.	.	.	.	.
99	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	.	3	2	1	1
101	1	1	1	1	1	1	1	1	2	3	.	.	5	1	3	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	.	1	.	8	.	8	.	1	.	2	.	.	.	.	.	.
104	.	1	.	1	.	1	.	.	.	2	.	.	.	.	.	5
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	1	.	8	.	1	.	8	.	4	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	8	8	.	8	8	8
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	3	.	.	.	.	2	2	2	.	2	2	2	2	.	.
84	1	.	2	3	2	3	.	3	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	5	.	2	.	2	.	.	.	.	.	.	.	.	.	.
89	3	2	2	2	2	2	2	2	2	2	2	2	2	2	.
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	1	3	3	3	3	3	3	3	3	3	3	.	.	.	.
93	.	2	2	2	2	2	.	2	.	2	.	.	.	.	.
94	.	.	2	2	2	2	2	2	.	.	3	3	3	3	3
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	2	.	.	3	3	2	3	3	3	3	3	.	.	.	.
100	.	.	.	.	.	2	2	2	2	2	2	.	2	.	2
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
104	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	2	2	2	2	2	2	2	2	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	.	3	.	.
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.	3	3	3	3	.	.	.	.
81	3	.	7	7	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
83	1	1	.	1	3	1	5	5	5	.	1	1	1	1	5	.	5	5	5	5	2	.	4	.	.
84	3	.	.	5	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
89	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	.	1	.	1
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92	1	1	1	1	2	2	2	2	2	2	2	2	5	5	5	.	5	5	5	5	.	.	.	.	.
93	3	3	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	.	.	.	.	3	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	5	.	2	.	.
99	1	5	5	5	5	5	2	2	2	2	2	2	3	2	3	.	.	.	.	.	.	.	.	.	.
100	.	3	3	.	4	3	.	4	4	4	3	.	3	3	.	.	3	3	.	.	.	.	.	.	.
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
103	6	3	.	1	5	5	6	1	4	1	5	5	5	5	1	.	1	1	1	1	1	.	6	.	3
104	.	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	3	5	5	.	.	.	.
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
73	.	.	.	.	.	.	.	.	.	.	.	.	.
74	.	.	.	.	.	.	.	.	.	.	.	.	.
75	.	.	.	.	2	.	.	.	.	.	2	2	.
76	.	.	.	.	.	.	.	.	.	.	2	2	2
77	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.	.	.	.	.
81	.	.	.	.	.	.	1	.	.	.	2	2	2
82	.	.	.	.	.	.	.	.	.	.	.	.	.
83	.	2	.	2	.	.	.	.	.	.	2	.	1
84	.	.	.	.	.	.	.	.	.	.	1	1	1
85	.	.	.	.	.	.	.	.	.	.	2	2	1
86	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	.	.	.	.	.	.	.	.	.
88	.	.	.	.	.	.	.	.	.	.	.	.	.
89	2	.	2	2	.	.	.	.	.	.	1	2	1
90	.	.	.	.	.	.	.	.	.	.	1	1	1
91	.	.	.	.	.	.	.	.	.	.	.	.	.
92	.	.	.	.	.	.	.	.	.	.	2	2	2
93	.	.	.	.	.	.	.	.	.	.	1	1	2
94	.	.	.	.	.	.	.	.	.	.	2	2	.
95	.	.	.	.	.	.	.	.	.	.	2	2	2
96	.	.	.	.	.	.	.	.	.	.	.	.	.
97	.	.	.	.	.	.	.	.	.	.	.	.	2
98	.	.	.	.	.	.	.	.	.	.	2	2	1
99	.	.	.	.	.	.	.	.	.	.	.	.	.
100	.	2	.	.	.	.	.	.	.	.	2	2	1
101	.	.	.	.	.	.	.	.	.	.	2	1	2
102	.	.	.	.	.	.	.	.	.	.	.	.	.
103	2	2	2	2	.	.	.	.	.	.	.	.	.
104	.	.	.	.	.	.	.	.	.	.	2	2	2
105	.	.	.	.	.	.	.	.	.	.	2	2	1
106	.	.	.	.	.	.	.	.	.	.	.	.	.
107	.	.	.	.	.	.	.	.	.	.	2	2	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
73	.	.	.	.	.	.	.	.	.	.	.	.	.	.
74	2	.	2	.	.	2	2	.	2	.	.	.	.	2
75	2	2	2	1	1	.	.	2	2	.	.	1	1	1
76	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	.	.	.
79	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80	2	2	2	2	2	.	.	.	2	.	.	2	2	2
81	.	.	.	.	.	.	.	.	.	.	.	.	.	.
82	.	2	.	1	.	.	.	2	2	.	.	1	.	.
83	1	1	1	1	2	2	2	2	2	2	2	1	1	2
84	1	2	2	1	2	.	.	2	2	.	.	1	1	1
85	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	.	.	.	.	1	.	.	.	2	.	.	.	1	2
88	1	2	2	1	1	2	2	1	1	.	.	1	1	.
89	1	1	1	1	2	1	1	1	1	1	1	1	1	1
90	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91	2	2	2	.	1	.	.	.	.	.	.	.	1	2
92	2	2	2	2	2	.	.	2	2	2	2	1	.	1
93	2	2	2	2	2	.	1	2	2	2	2	1	1	2
94	2	2	2	2	2	.	.	2	.	.	.	.	.	2
95	.	.	.	.	.	.	.	.	.	.	.	.	.	.
96	2	2	2	.	2	.	.	.	.	.	.	.	.	2
97	1	2	2	1	1	1	2	1	1	1	1	1	1	1
98	.	.	.	.	.	.	.	.	.	.	.	.	.	.
99	1	2	2	1	1	2	2	1	1	.	.	1	1	2
100	1	2	2	1	1	2	2	1	1	1	1	1	1	2
101	.	.	.	.	.	.	.	.	.	.	.	.	.	.
102	2	.	.	.	1	.	.	.	.	.	.	.	1	2
103	1	2	2	2	2	2	2	.	2	.	.	.	.	2
104	1	2	2	1	1	.	2	.	2	2	2	1	1	2
105	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	2	.	2	.	2	.	.	2	2	.	.	.	1	1
107	.	.	.	.	.	.	.	.	.	.	.	.	.	.
108	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
73	.	.	.	.	SIR	93	3	3	6	NNT	1 83
74	2	.	.	.	SIR	93	3	2	6	NNT	1 84
75	1	.	.	.	SIR	93	3	1	3	NNT	1 88
76	.	.	.	.	SIR	93	3	1	7	NNT	1 88A
77	.	.	.	.	SIR	93	3	3	7	NNT	1 88B
78	.	.	.	.	SIR	93	3	1	7	NNT	1 90
79	.	.	.	.	SIR	93	3	1	7	NNT	1 C
80	2	.	.	.	NLV	94	3	1	2	NNT	2 1
81	.	.	.	.	NLV	94	3	3	5	NNT	2 2
82	.	.	.	.	NLV	94	3	1	2	NNT	2 3
83	1	.	.	.	NLV	94	3	2	2	NNT	2 4
84	2	.	.	.	NLV	94	3	3	5	NNT	2 5
85	.	.	.	.	NLV	94	3	1	2	NNT	2 7
86	.	.	.	.	NLV	94	3	3	6	NNT	2 7A
87	2	.	.	.	NLV	94	3	2	6	NNT	2 8
88	1	.	.	.	NLV	94	3	1	2	NNT	2 9
89	1	.	.	.	NLV	94	3	1	2	NNT	2 10
90	.	.	.	.	NLV	94	3	2	7	NNT	2 11
91	2	.	.	.	NLV	94	3	1	6	NNT	2 12
92	1	.	.	.	NLV	94	3	1	5	NNT	2 14
93	1	.	.	.	NLV	94	3	2	5	NNT	2 15
94	2	.	.	.	NLV	94	3	2	6	NNT	2 16
95	.	.	.	.	NLV	94	3	2	7	NNT	2 17
96	.	.	.	.	NLV	94	3	3	7	NNT	2 18
97	1	.	.	.	NLV	94	3	2	1	NNT	2 20
98	.	.	.	.	NLV	94	3	2	2	NNT	2 21
99	2	4	.	.	NLV	94	3	2	2	NNT	2 22
100	2	.	.	.	NLV	94	3	1	2	NNT	2 23
101	.	.	.	.	NLV	94	3	1	2	NNT	2 24
102	2	.	.	.	NLV	94	3	1	5	NNT	2 25
103	2	.	.	.	NLV	94	3	1	2	NNT	2 26
104	.	.	.	.	NLV	94	3	1	3	NNT	2 27
105	.	.	.	.	NLV	94	3	2	7	NNT	2 28
106	2	.	.	.	NLV	94	3	1	5	NNT	2 29
107	.	.	.	.	NLV	94	3	2	7	NNT	2 30
108	.	.	.	.	NLV	94	3	2	7	NNT	2 31

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
109	3	.	.	1	1	.	1	.	7	.	7	.	.	6
110	.	7	.	2	1	1	1	7	.	7	.	.	.	1
111	.	.	.	1	4	1	.	2	.	1	.	8	.	2
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	1	.	.	.	5	.	1	.	.	.	7	.	.	.
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	8	8	1	1	7	7	1	.	1	1	1
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.
118	1	1	.	1	1	1	1	7	7	1	7	1	1	1
119	.	.	.	5	.	1	.	7	.	1	.	1	.	9
120	.	.	.	5	.	1	.	.	.	7	.	.	.	2
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	2	2	1	.	7	.	.	.	.	.	2
124	.	.	.	1	1	.	1	7	7	1	1	1	1	4
125	.	.	.	.	.	.	.	.	.	.	.	.	.	7
126	1	1	.	1	4	1	1	.	.	1	1	.	.	8
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	2	2	.	.	.	.	.	.	.	.	9
129	1	7	.	1	1	1	1	7	7	1	1	.	.	4
130	1	7	.	1	.	1	1	7	7	1	1	1	1	1
131	.	.	.	.	.	.	.	.	.	.	.	.	.	2
132	.	.	.	3	3	.	1	.	.	.	.	.	.	4
133	7	.	.	3	1	.	.	.	.	.	1	.	.	.
134	1	.	.	4	4	1	1	7	7	7	7	.	.	9
135	.	.	.	4	.	7	.	.	.	.	.	.	.	.
136	1	1	.	8	8	1	1	7	7	7	7	1	1	9
137	1	7	.	1	1	1	1	7	7	1	1	1	1	1
138	.	.	.	.	2	.	.	.	7	.	.	.	.	.
139	.	.	.	2	2	1	.	7	7	.	.	.	.	2
140	.	.	.	2	.	.	.	.	.	.	.	.	.	.
141	.	.	.	2	2	.	.	.	7	.	.	.	.	5
142	.	.	.	.	.	.	.	.	.	.	.	.	.	1
143	1	.	.	8	8	1	1	7	7	.	.	1	1	1
144	.	.	.	.	3	.	.	.	.	.	.	.	.	5

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
109	3	1	4	1	4	7	7	7	7	.	.	8	2
110	1	1	1	1	1	1	1	1	2	.	.	1	1
111	1	2	1	7	7	7	7	7	7	1	2	.	.
112	.	3	3	3	.	.	.	.	.	.	.	.	.
113	7	.	.	.	.	.	.	.	1	.	.	8	.
114	.	.	.	.	5	.	.	.	1	.	.	2	5
115	.	.	.	.	.	.	.	.	.	.	.	.	8
116	1	8	8	7	3	1	1	7	.	.	.	8	8
117	8	.	3	.	.	.	.	.	.	.	.	.	.
118	1	1	6	1	8	7	7	1	1	.	.	1	8
119	4	.	2	.	8	7	7	7	.	.	.	8	8
120	4	.	8	.	8	.	7	.	.	.	.	3	3
121	7	.	.	.	.	.	.	.	.	.	.	2	2
122	.	.	.	.	.	.	.	.	.	.	.	4	4
123	2	2	2	3	.	1	1	.	.	.	.	2	2
124	2	3	8	3	8	1	.	.	7	.	.	8	8
125	.	.	.	7	.	7	7	1	.	.	.	1	2
126	.	9	.	6	.	1	1	7	.	.	.	2	3
127	.	.	7	.	7	7	7	1	.	.	.	2	7
128	2	5	.	3	.	.	.	.	.	.	.	2	2
129	.	.	.	3	.	.	.	.	.	.	.	.	.
130	1	1	1	1	1	7	7	7	7	.	.	2	2
131	2	8	2	8	8	.	.	.	.	.	.	2	.
132	7	2	.	3	.	1	1	7	7	.	.	.	7
133	4	4	8	4	9	7	7	7	7	.	.	1	2
134	7	2	2	8	8	7	7	7	7	.	.	1	1
135	7	2	.	2	7	.	.	.	.	.	.	3	3
136	9	9	2	1	8	7	7	7	7	.	.	6	8
137	1	7	8	7	1	1	1	1	1	1	1	6	1
138	9	.	4	8	1	7	.	.	7	.	.	1	2
139	2	.	.	.	.	7	7	7	.	.	.	.	5
140	.	.	.	.	.	.	.	.	.	.	.	8	7
141	.	5	.	.	5	.	7	.	.	.	.	6	6
142	1	.	.	.	.	.	.	.	.	.	.	.	.
143	9	6	8	1	8	.	.	.	.	.	.	.	.
144	9	2	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
109	.	1	1	9	1	9	.	1	.	.	.	.
110	1	1	1	1	1	1	.	.	.	.	1	.
111	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	4	.	.	.	.	.	.	.	.
114	1	.	2	8	.	5	.	.	.	.	.	.
115	.	.	1	.	7	.	.	.	.	.	.	.
116	.	1	5	5	1	7	.	.	1	1	.	.
117	.	.	.	.	.	.	.	.	.	.	.	.
118	1	1	2	1	1	1	1	1	.	.	.	.
119	.	1	.	.	.	.	.	1	.	1	.	.
120	.	.	.	.	4	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.
122	1	1	2	1	2	1	.	.	.	.	.	.
123	.	.	5	2	.	2	.	.	.	.	.	.
124	1	1	2	2	2	2	.	.	.	.	.	.
125	.	.	3	5	7	.	.	.	.	.	.	.
126	.	.	4	7	9	.	.	.	1	.	.	.
127	1	.	7	1	.	7	.	.	.	.	.	.
128	1	.	5	5	7	7	.	.	.	.	.	.
129	1	.	.	.	.	.	.	.	.	.	.	.
130	.	1	4	8	4	2	.	1	1	1	.	1
131	.	.	5	.	2	.	.	.	.	1	.	.
132	.	.	.	.	.	.	.	1	.	.	.	.
133	1	1	2	1	2	2	.	.	.	.	.	1
134	.	1	1	1	2	8	.	.	.	.	.	.
135	.	.	.	.	.	.	1	.	1	1	.	.
136	1	1	9	1	1	1	.	.	1	1	1	.
137	.	1	.	1	.	.	.	1	.	1	.	.
138	1	.	2	2	1	9	1	.	1	1	.	.
139	.	.	9	9	.	.	.	.	1	.	1	.
140	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	.	.	.	.	1	.	1	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	.	.	.	.	.	.	.
144	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
109	.	.	.	1	.	.	.	.	.	.	4	1	1	1
110	1	.	1	.	1	.	.	.	.	.	1	4	1	1
111	.	.	.	.	.	.	.	.	.	.	1	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	.
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	1	.	.	1	.	.	.	.	.	.	7	1	1	8
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.
118	.	.	.	1	.	1	.	.	.	.	4	.	1	3
119	1	.	.	.	1	.	.	.	.	.	.	1	.	1
120	.	.	.	.	.	.	.	.	.	.	4	.	4	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	1	1	.	.	.	.	.	.	.	.	1	.	8
125	.	.	.	.	.	.	.	.	.	.	.	4	.	4
126	.	.	.	.	.	.	.	.	.	.	1	.	1	.
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	1	.	.	.	.	.	.	.	2	.
129	.	.	.	.	.	.	.	.	.	.	.	.	.	.
130	.	.	.	1	.	.	.	.	.	.	4	4	1	4
131	.	.	.	.	.	.	.	.	.	.	.	1	.	.
132	.	.	.	1	.	.	.	.	.	.	.	.	.	.
133	.	.	.	.	.	.	.	.	.	.	1	1	1	8
134	.	.	.	.	.	.	.	.	.	.	.	6	.	.
135	1	.	1	.	.	.	.	.	.	.	.	.	.	9
136	1	.	1	.	.	.	.	.	.	.	.	3	.	3
137	.	1	.	1	.	1	.	.	1	1	.	1	1	1
138	.	.	.	1	.	1	.	.	.	.	.	3	.	.
139	.	.	.	1	.	.	.	.	1	.	3	.	1	2
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	1	.	.	.	1	.	.	.	.	.	2	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	.	.	.	.	.	.	.	8	4
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
109	9	.	.	3	.	2	6	8	.	.	1	1	1
110	1	1	1	3	1	3	13	6	.	.	1	1	1
111	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.
114	.	.	.	.	.	.	.	.	.	.	.	1	7
115	.	.	.	.	.	.	.	.	.	.	.	.	.
116	8	1	1	1	.	1	4	9	.	.	1	1	7
117	.	.	.	.	.	.	.	.	.	.	.	.	.
118	1	3	.	1	.	.	14	9	.	.	1	1	1
119	.	1	.	1	.	3	.	8	.	.	.	.	.
120	1	4	1	.	4	.	6	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	1	1	1
123	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	3	.	3	.	1	.	7	.	.	1	1	7
125	.	4	.	4	.	.	6	9	.	.	.	.	.
126	1	.	1	.	1	.	8	.	.	.	1	.	1
127	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	3	.	.	.	.	1	.
129	.	.	.	.	.	.	.	.	.	.	.	.	.
130	1	3	1	8	1	.	8	2	.	.	1	7	7
131	.	1	.	2	.	.	.	.	.	.	1	.	7
132	.	.	.	.	.	.	.	.	.	.	.	.	.
133	1	8	.	.	.	.	7	2	.	.	1	1	7
134	.	.	.	3	.	.	.	7	.	.	1	.	7
135	8	.	.	1	.	4	.	3	.	.	.	1	.
136	1	.	3	1	3	.	4	8	.	.	1	1	1
137	.	1	.	1	.	.	5	12	.	.	1	1	1
138	.	3	.	3	.	1	2	5	.	.	1	1	4
139	1	.	4	.	.	.	.	3	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	.	.	.	.	7	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.
143	1	.	1	.	1	.	5	.	.	.	.	.	.
144	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
109	1	1	1	1	1	1	1	.	1	.	1	1	1
110	3	1	1	1	1	1	1	1	.	1	.	1	1
111	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.
114	7	.	.	1	.	1	1	.	.	.	.	1	4
115	.	.	.	.	.	.	.	.	.	.	.	.	.
116	7	1	1	1	1	1	1	1	.	1	1	1	1
117	.	.	.	.	.	.	.	.	.	.	.	.	.
118	1	1	.	.	.	1	.	.	.	.	.	1	.
119	.	.	.	.	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.
122	1	1	1	1	.	1	.	.	.	1	.	2	.
123	.	.	.	.	.	.	.	.	.	.	.	.	.
124	.	1	.	1	.	1	1	.	1	1	1	1	1
125	.	.	.	.	.	.	.	.	.	.	.	.	.
126	.	1	.	1	1	1	1	1	1	1	.	1	1
127	.	.	.	.	.	.	.	.	.	.	.	.	.
128	7	.	.	1	1	.	.	.	.	.	.	.	.
129	.	.	.	.	.	.	.	.	.	.	.	.	.
130	7	1	.	.	1	.	.	.	.	1	.	7	.
131	.	7	.	.	1	1	1	1	1	1	.	1	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.
133	1	.	1	1	1	.	1	.	1	.	1	4	1
134	.	1	.	1	1	.	.	.	.	1	.	4	.
135	.	.	1	1	1	.	.	.	1	.	.	.	1
136	1	1	.	1	.	1	.	1	1	.	.	1	4
137	1	1	.	.	1	1	1	.	1	1	.	1	1
138	1	7	1	.	1	1	1	1	1	1	1	1	1
139	.	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	.	.	.	.	.	.	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	.	.	.	.	.	.	.	.
144	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
109	1	1	1	1	1	1	1	1	2	4	.	.	.	.	.	1
110	1	1	1	1	1	1	1	1	4	4	.	.	5	1	.	1
111	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	3
114	7	2	7	2	7	2	7	2	4	4	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	1	8	8	1	1	1	1	1	7	5	.	.	3	1	5	5
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
118	3	.	3	.	3	.	3	.	1	.	.	.	1	1	1	1
119	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	1
120	.	.	.	.	.	.	.	.	.	.	.	.	7	.	3	2
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	1	.	1	1	1	1	1	1	7	1	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	1	1	1	1	1	1	1	1	3	3	.	.	1	1	1	1
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	1	1	1	4	8	4	1	.	5	3	.	.	3	.	.	.
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	.	.	.	.	.	.	.	.	.	.	.	3	2	5	1
130	8	.	2	.	3	.	3	.	5	.	.	.	1	1	1	1
131	3	.	3	3	3	3	3	3	5	2	.	.	.	1	3	3
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	5
133	8	.	8	3	3	1	1	3	1	.	.	.	7	5	2	5
134	1	.	1	.	1	.	1	.	5	.	.	.	.	1	1	1
135	3	2	9	2	8	2	1	3	4	4	.	.	3	1	2	5
136	8	8	1	8	8	8	8	1	2	4	.	.	3	1	5	5
137	1	1	1	1	1	1	1	1	3	5	.	.	3	1	1	1
138	1	1	.	.	8	8	8	8	1	2	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	.	.	.	.	.	.	.	.	.	.	3	1	1	3
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1
144	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
109	1	1	3	3	5	5	5	5	2	5	5	5	.	5	2	.	5	3	3	5	5	.	7	.	1
110	5	2	.	.	5	5	5	3	5	5	5	5	5	5	5	.	5	5	5	3	5	.	.	1	.
111	.	.	.	.	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
112	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
113	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	1	6	5	2	3	5	5	1	1	3	5	5	5	5	5	.	3	3	3	3	3	.	7	.	1
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
118	1	1	5	1	5	5	5	5	5	1	1	5	1	1	1	.	5	5	5	5	5	.	.	.	.
119	1	.	.	3	3	2	2	2	2	5	5	5	5	5	5	.	5	5	5	5	.	.	.	.	2
120	5	3	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.
123	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	5	5	5	3	5	5	5	1	1	5	2	1	1	1	1	.	1	1	5	5	.	.	.	.	1
125	.	.	.	.	5	5	5	5	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
126	.	.	3	5	.	3	.	5	.	5	5	5	2	2	.	.	.	.	.	.	.	.	5	.	.
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	3	.	.	.	.	.	.	.	.	.	3	5	.	.	.	.	.	.	3	3	.	.	.	.
129	1	1	1	1	2	5	5	5	5	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
130	1	.	1	1	1	1	1	1	5	5	5	5	5	5	5	.	1	1	1	2	1	.	5	.	1
131	.	.	.	.	.	.	.	.	.	3	3	.	.	3	.	.	.	.	.	.	.	.	.	.	.
132	5	2	.	3	.	3	3	3	5	3	.	.	5	1	1	.	1	.	1	1	5	.	5	.	2
133	5	5	.	3	.	4	6	6	5	5	6	6	1	1	1	.	1	1	2	1	1	.	5	.	.
134	1	1	3	1	3	3	3	3	3	3	3	3	3	3	3	.	2	5	5	3	5	.	4	1	3
135	5	2	5	.	.	.	3	3	3	.	.	.	.	.	.	.	3	3	3	.	.	.	.	.	.
136	5	5	3	5	3	5	2	1	5	1	1	3	1	2	1	.	1	1	1	3	.	.	7	.	.
137	5	5	5	5	1	5	1	5	5	1	1	1	1	1	1	.	5	5	1	1	1	.	5	.	2
138	.	.	.	.	.	.	3	.	3	3	3	3	3	3	.	.	3	.	.	.	.	.	.	.	.
139	1	1	5	5	3	2	3	5	5	5	5	5	3	.	.	.	8	8	8	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
141	2	2	5	2	1	3	.	3	.	7	4	.	.	.	.	.	7	7	7	7	.	.	.	.	.
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	2	.	.	5	5	5	5	5	5	.	5	3	3	.	.	.	3	.	.	.	.	.	.	.	.
144	1	.	.	.	.	3	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
109	2	2	5	3	3	5	2	2	2	2	2	2	2	2	.
110	.	.	.	3	3	3	3	3	3	3	3	3	3	3	3
111	.	2	2	2	2	2	2	2	2	2	2	2	.	.	.
112	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.
113	.	.	.	.	2	.	2	.	.	.	2	.	3	.	.
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	2	.	2	.	2	2	2	2	2	2	2	2	2	.
117	.	.	.	3	3	3	3	3	3	3	3	3	3	3	3
118	.	.	.	3	2	3	3	2	3	2	3	2	3	3	3
119	.	.	2	.	2	2	2	2	.	.	.	.	.	.	.
120	.	.	.	.	2	.	2	.	2	.	.	.	.	.	.
121	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
124	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	.	.	.	.	.	.	2	.	2	.	2	.	2	.	2
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
129	.	2	.	2	2	2	2	2	2	.	.	.	.	.	.
130	.	2	.	2	.	2	.	2	2	2	2	2	2	.	2
131	.	.	.	.	.	.	.	3	.	3	.	3	3	.	3
132	.	.	.	2	2	2	2	2	2	2	.	.	.	.	.
133	.	.	.	.	2	.	2	.	2	.	2	.	.	.	.
134	.	3	.	2	.	2	.	2	.	2	.	.	.	2	.
135	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.
136	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
137	2	.	.	.	2	.	2	.	2	2	2	2	2	2	2
138	.	.	.	.	.	.	.	.	.	.	2	.	2	.	2
139	.	.	.	.	.	3	3	3	3	3	3	3	3	3	3
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	.	.	.	.	.	.	.	.	2	2	.	.	2
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	.	.	.	.	.	2	.	2	2	2	2	2	2	.	2
144	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
109	2	2	.	.	.	2	.	2	.	.	1	1	2
110	3	3	3	3	.	.	.	.	.	.	1	1	1
111	.	.	.	.	.	.	.	.	.	1	1	1	1
112	.	.	.	.	.	.	.	.	.	.	2	.	2
113	.	.	.	.	.	.	.	.	.	.	2	2	2
114	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.
116	.	.	.	.	.	.	.	.	.	.	1	1	2
117	3	3	3	.	.	.	.	.	.	.	.	.	.
118	3	2	3	2	.	.	.	.	.	.	2	1	1
119	.	.	.	.	.	.	.	.	.	.	1	1	1
120	.	.	.	.	.	.	.	.	.	.	2	1	2
121	.	.	.	.	.	.	.	.	.	.	.	.	2
122	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	.	.	.	.	.	.	.	.	.	2	2	.
124	2	2	2	2	2	2	.	.	.	.	1	1	1
125	2	.	2	.	2	.	.	.	.	.	1	1	1
126	.	2	.	.	.	.	.	.	.	.	.	.	2
127	.	.	.	.	.	.	.	.	.	.	.	.	.
128	.	.	.	.	.	.	.	.	.	.	1	1	1
129	.	.	.	.	.	.	.	.	.	.	1	1	1
130	.	2	.	2	.	2	1	1	.	.	2	2	2
131	.	3	.	.	.	.	.	.	.	.	1	1	1
132	.	.	.	.	.	.	.	.	.	.	.	.	.
133	.	.	.	2	.	.	.	.	.	.	.	.	.
134	.	2	.	2	2	2	2	.	.	.	2	2	2
135	.	.	.	.	.	.	.	.	.	.	1	1	1
136	.	.	.	.	.	.	.	.	.	.	1	1	1
137	2	.	2	.	2	2	2	.	.	.	1	1	1
138	.	.	.	2	.	2	.	.	.	.	.	.	.
139	3	.	.	.	.	.	.	.	.	.	.	.	.
140	.	.	.	.	.	.	.	.	.	.	.	.	.
141	.	.	2	2	.	.	.	.	.	.	2	2	2
142	3	.	.	.	.	.	.	.	.	.	.	.	.
143	.	2	.	.	.	.	.	.	.	.	2	2	2
144	.	.	.	.	.	.	.	.	.	.	1	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
109	1	1	1	2	1	2	1	1	1	2	2	.	1	.
110	1	1	2	1	2	2	2	2	2	2	2	1	1	1
111	2	2	2	2	.	.	2	.	.	.	1	1	2	.
112	2	2	2	2	2	.	.	.	.	2	.	.	.	.
113	.	2	2	1	.	.	.	2	2	.	.	1	.	.
114	.	.	.	.	.	.	.	.	.	.	.	.	.	.
115	.	.	.	.	.	.	.	.	.	.	.	.	.	.
116	2	2	2	2	1	.	1	.	.	2	2	1	1	2
117	.	.	.	.	.	.	.	.	.	.	.	.	.	.
118	1	.	.	1	.	1	1	1	1	.	.	1	.	1
119	1	1	1	.	1	.	.	.	.	2	2	.	1	.
120	2	.	2	.	2	.	.	.	2	.	2	1	1	2
121	2	2	2	.	.	.	.	.	.	.	.	.	2	.
122	.	.	.	.	.	.	.	.	.	.	.	.	.	.
123	.	2	2	2	2	.	.	.	.	.	.	.	.	2
124	1	1	1	1	1	1	.	.	.	1	1	1	1	1
125	2	2	2	1	2	.	2	2	.	.	1	1	.	.
126	2	.	.	2	.	2	.	2	2	.	.	.	.	.
127	.	.	.	.	.	.	.	.	.	.	.	.	.	.
128	1	2	2	1	1	2	2	1	1	.	.	1	1	1
129	1	2	2	1	1	1	1	1	1	1	1	1	1	1
130	1	2	1	.	1	.	1	2	2	.	.	.	1	1
131	2	2	2	.	1	.	2	.	.	2	2	.	1	.
132	.	.	.	.	.	.	.	.	.	.	.	.	.	.
133	.	.	.	.	.	.	.	.	.	.	.	.	.	1
134	2	2	2	2	.	2	2	2	.	.	.	1	1	2
135	1	2	2	1	1	2	2	2	2	.	.	1	1	2
136	1	2	2	1	1	.	2	2	2	2	2	1	1	1
137	1	1	1	1	1	1	2	1	2	1	2	1	1	1
138	.	.	.	.	.	.	.	.	.	.	.	.	.	.
139	.	.	.	.	.	.	.	.	.	.	.	.	.	2
140	.	.	.	.	.	.	.	.	.	.	.	.	.	.
141	2	1	1	1	1	2	.	2	.	.	.	1	1	1
142	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	2	2	2	2	2	2	1	2	1	.	1	1	1	1
144	1	2	2	2	2	2	2	.	.	.	.	1	1	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
109	1	.	.	.	NLV	94	3	1	1	NNT	2 32
110	2	.	.	.	NLV	94	3	1	1	NNT	2 33
111	.	.	.	.	NLV	94	3	1	5	NNT	2 34
112	1	.	.	.	NLV	94	3	2	5	NNT	2 35
113	.	.	.	.	NLV	94	3	2	5	NNT	2 36
114	.	.	.	.	NLV	94	3	2	7	NNT	2 37
115	.	.	.	.	NLV	94	3	1	7	NNT	2 38
116	2	1	.	.	NLV	94	3	2	3	NNT	2 39
117	.	.	.	.	NLV	94	3	3	5	NNT	2 40
118	1	3	.	.	NLV	94	3	1	2	NNT	2 41
119	.	.	.	.	NLV	94	3	1	3	NNT	2 42
120	2	.	.	.	NLV	94	3	2	2	NNT	2 43
121	2	.	.	.	NLV	94	3	2	2	NNT	2 43A
122	.	.	.	.	NLV	94	3	2	7	NNT	2 45
123	2	.	.	.	NLV	94	3	3	6	NNT	2 46
124	1	.	.	.	NLV	94	3	1	2	NNT	2 47
125	.	.	.	.	NLV	94	3	2	2	NNT	2 48
126	2	.	.	.	NLV	94	3	1	3	NNT	2 49
127	.	.	.	.	NLV	94	3	3	5	NNT	2 51
128	1	.	.	.	NLV	94	3	2	3	NNT	2 52
129	1	.	.	.	NLV	94	3	1	2	NNT	2 55
130	1	3	.	.	NLV	94	3	1	1	NNT	2 56
131	.	.	.	.	NLV	94	3	2	7	NNT	2 57
132	.	.	.	.	NLV	94	3	2	2	NNT	2 58
133	.	.	.	.	NLV	94	3	2	1	NNT	2 59
134	2	.	.	.	NLV	94	3	2	1	NNT	2 60
135	2	.	.	.	NLV	94	3	1	3	NNT	2 61
136	1	.	.	.	NLV	94	3	1	2	NNT	2 62
137	1	.	.	.	NLV	94	3	1	2	NNT	2 64
138	.	.	.	.	NLV	94	3	1	2	NNT	2 67
139	2	.	.	.	NLV	94	3	2	2	NNT	2 68
140	.	.	.	.	NLV	94	3	2	7	NNT	2 69
141	1	.	.	.	NLV	94	3	1	3	NNT	2 70
142	.	.	.	.	NLV	94	3	3	6	NNT	2 70A
143	1	.	.	.	NLV	94	3	2	2	NNT	2 71A
144	1	.	.	.	NLV	94	3	1	2	NNT	2 71B

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	3	.	.	.	.	.	.	.	.	.	.
148	.	7	.	1	1	1	1	7	7	7	7	1	1	4
149	.	.	.	.	1	.	7	.	7	.	.	.	.	.
150	.	.	.	1	1	1	.	.	7	7	7	1	.	1
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	.	.	.	.	1	1	7	7	.	.	.	1	1
153	7	7	.	1	1	1	1	7	7	7	7	1	1	1
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	.	7	.	.	1	.	.	.	.	.	.	.	.	1
156	.	.	.	.	2	.	.	.	.	.	.	.	.	.
157	.	.	.	2	2	1	.	7	7	7	7	1	.	4
158	.	.	.	2	.	1	7	.	7	1	.	.	.	1
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.	2
162	.	.	.	4	.	.	.	.	.	.	.	.	.	7
163	.	1	.	1	3	1	.	7	.	1	.	1	.	1
164	.	.	.	2	.	.	.	.	.	7	.	.	.	5
165	.	.	.	.	.	.	.	.	.	.	.	.	.	5
166	.	.	.	4	.	1	.	7	.	.	.	.	.	1
167	.	.	.	.	.	.	.	.	.	.	.	.	.	9
168	.	.	.	.	4	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	7	.	.	1	8	1	1	.	.	.	.	1	1	1
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	7	.	1	1	1	7	.	7	1	.	1	1	1
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	.	.	1	1	1	1	.	.	.	.	1	1	1
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	.	.	.	.	.	.	.	.	.	.	.	.
177	.	.	.	2	2	1	1	.	.	1	1	.	.	9
178	.	.	.	.	.	1	.	.	.	.	.	1	.	1
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	.	1	1	1	.	.	.	1	1	.	1	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
145	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	7	.	7	.	.	2	8
147	.	.	.	.	.	.	.	.	.	.	.	.	.
148	9	.	1	2	1	1	.	3	3	.	.	1	2
149	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	2	2
152	5	1	8	1	8	.	.	7	7	.	.	8	8
153	1	1	1	8	8	7	7	7	1	.	.	1	1
154	.	.	.	.	.	.	.	.	.	.	.	.	.
155	1	2	2	2	2	.	.	7	1	.	.	1	1
156	3	.	.	.	.	.	.	.	.	.	.	.	.
157	1	7	7	3	3	.	1	7	7	.	.	1	1
158	7	1	1	1	1	7	1	1	1	7	1	1	1
159	.	5	.	5	4	.	.	.	.	.	.	2	5
160	1	.	.	.	3	.	.	.	.	.	.	1	3
161	2	.	.	.	.	1	1	.	.	.	.	8	4
162	7	.	.	7	.	.	.	7	.	.	.	1	1
163	.	1	.	1	.	.	.	7	.	.	.	.	8
164	5	.	7	.	5	.	.	.	.	.	.	2	2
165	5	.	5	.	5	.	.	.	.	.	.	.	.
166	7	9	.	8	3	.	.	1	1	.	.	8	3
167	.	7	.	8	.	.	.	.	.	.	.	.	.
168	.	.	.	.	3	.	.	.	.	.	.	.	.
169	9	.	6	.	.	7	.	.	.	.	.	5	.
170	2	2	8	8	8	7	.	7	1	.	7	8	8
171	2	4	.	.	7	7	7	.	7	.	.	3	3
172	.	6	8	1	2	7	7	7	7	.	1	8	1
173	.	.	.	.	.	.	.	.	.	.	.	.	.
174	1	1	1	1	8	1	1	1	1	1	1	1	1
175	.	.	.	.	.	.	.	.	.	.	.	.	.
176	8	.	3	.	.	.	7	.	.	.	.	.	1
177	9	2	1	2	1	.	7	.	.	.	.	5	.
178	8	1	3	1	3	.	.	7	7	7	.	1	1
179	.	.	.	.	.	.	.	.	.	.	.	.	.
180	2	4	.	7	.	7	7	7	7	.	.	1	1

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
145	.	.	.	.	.	.	.	.	.	.	.	.
146	1	.	5	5	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.
148	.	.	6	2	.	4	.	.	1	1	.	.
149	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.
152	1	1	4	4	7	7	.	1	1	1	1	1
153	.	.	1	1	1	1	.	1	.	.	1	1
154	.	.	2	2	2	2	.	.	.	.	.	.
155	.	.	1	1	2	2	.	.	.	.	.	.
156	.	.	.	.	.	.	.	.	.	.	.	.
157	1	1	1	8	2	2	.	.	.	.	.	.
158	.	1	1	1	9	2	1	.	.	.	1	.
159	.	.	2	2	9	2	.	1	.	1	.	.
160	.	.	3	4	.	.	.	.	.	.	.	.
161	.	.	2	4	2	.	.	.	.	.	.	.
162	7	.	1	9	2	5	.	1	.	.	.	.
163	.	.	.	.	3	.	.	.	.	.	1	.
164	.	.	5	5	7	.	1	1	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	2	2	.	5	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.
170	1	1	2	7	9	2	.	.	1	.	1	.
171	.	.	.	.	.	.	.	.	.	.	.	.
172	.	9	3	9	8	.	.	.	.	.	.	.
173	.	1	2	.	.	7	.	.	.	.	.	.
174	.	.	1	1	1	1	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.
176	.	1	.	2	.	7	.	.	.	.	.	.
177	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	2	1	9	2	.	.	.	.	.	.
179	.	.	.	.	.	.	.	.	.	.	.	.
180	1	1	1	3	9	2	1	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	2	.	8
147	.	.	.	.	.	.	.	.	.	.	.	.	.	.
148	1	.	1	.	.	1	.	.	.	.	3	2	1	1
149	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	.	.	1	1	1	1	.	.	.	1	1	1	1
153	.	.	.	1	.	1	.	.	.	.	1	1	8	2
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	.	.	.	.	.	.	.	.	.	.	.	.	.	2
156	.	.	.	.	.	.	.	.	.	.	.	.	.	.
157	.	.	.	.	.	.	.	.	.	.	2	1	.	3
158	.	.	.	1	1	1	.	.	.	.	.	.	1	8
159	1	.	.	.	.	1	.	.	.	.	.	2	2	3
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	1	.	.	.	.	.	.	.	.	.	.
163	.	.	.	.	.	.	.	.	.	.	1	.	.	.
164	.	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	.	.	1	.	.	.	.	.	.	.	1	1	1	1
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	.	.	.	.	.	.	.	.	1	1	.	1
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	.	.	.	.	.	.	.	.	.	1	.	1	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	.	.	.	.	.	.	.	.	.	.	.	.
177	.	.	.	1	.	.	.	.	.	.	1	1	.	.
178	.	.	.	.	.	.	.	.	.	.	1	.	1	.
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	1	.	.	.	.	.	.	.	.	4	.	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
145	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	1	.	1	.	1	.	3	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	.
148	3	1	4	.	1	.	4	7	.	.	1	.	7
149	.	.	.	.	.	.	1	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.
152	1	1	1	8	8	8	8	1	.	.	1	1	1
153	8	1	1	2	1	2	4	3	.	.	1	1	1
154	.	.	.	.	.	.	.	.	.	.	1	7	1
155	.	2	.	.	.	.	.	.	.	.	1	.	1
156	.	.	.	.	.	.	.	.	.	.	.	.	.
157	.	3	2	3	2	3	4	10	.	.	1	1	7
158	1	1	1	1	1	1	7	7	.	.	1	1	1
159	2	3	1	1	2	1	3	6	.	.	1	.	1
160	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	1	.	.	.	.	1
163	1	.	.	.	.	.	1	.	.	.	.	.	.
164	.	.	.	.	.	.	1	.	.	.	1	1	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.
170	1	1	1	1	1	1	7	10	.	.	1	1	1
171	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	.	.	.	3	.	3	.	.	1	1	1
173	.	.	.	.	.	.	.	.	.	.	.	.	.
174	1	.	1	.	1	.	4	.	.	.	1	1	1
175	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	.	.	.	.	.	.	.	.	.	1	.
177	.	8	.	1	.	.	.	3	.	.	.	.	.
178	1	.	1	.	.	.	1	.	.	.	.	.	.
179	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	.	.	.	.	.	7	.	.	.	1	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
145	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	.
148	1	.	1	1	.	1	.	1	.	1	.	1	1
149	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.
152	1	1	1	1	1	1	1	1	1	1	1	1	.
153	1	1	1	1	1	1	1	1	1	1	1	1	1
154	1	1	.	1	.	1	.	.	.	.	.	2	4
155	1	.	.	.	.	.	.	.	.	.	.	1	.
156	.	.	.	.	.	.	.	.	.	.	.	.	.
157	7	7	1	1	.	1	1	1	1	1	1	1	6
158	1	.	1	.	.	1	1	.	1	1	1	8	8
159	.	.	.	.	.	.	.	.	.	.	.	.	1
160	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	.	.	.	.	4	.
163	.	.	.	.	.	.	.	.	.	.	.	.	.
164	.	.	.	.	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.
166	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.
170	1	1	1	1	.	1	.	1	.	1	.	1	1
171	.	.	.	.	.	.	.	.	.	.	.	.	.
172	2	1	.	1	.	1	1	1	1	1	1	1	1
173	.	.	.	.	.	.	.	.	.	.	.	.	.
174	1	.	.	.	.	.	.	.	.	.	.	1	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.
176	1	.	.	.	.	.	1	.	.	.	.	.	1
177	.	.	.	.	.	.	.	.	.	.	.	.	.
178	.	.	.	.	.	.	.	.	.	.	.	.	.
179	.	.	.	.	.	.	.	.	.	.	.	.	.
180	1	.	.	.	1	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
148	.	1	3	1	3	1	3	1	1	5	.	.	.	1	1	5
149	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	1	.	1	.	1	.	1	.	6	5	.	.	.	.	.	.
153	1	8	1	1	3	1	3	8	4	4	.	.	3	1	1	1
154	2	3	2	.	2	2	2	2	4	3	.	.	.	.	.	.
155	.	.	.	.	.	.	.	.	1	1	.	.	1	1	3	3
156	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
157	3	.	3	8	3	8	1	2	3	3	.	.	3	2	5	5
158	1	1	.	1	3	8	1	1	5	2	.	.	.	.	.	.
159	.	1	.	.	.	.	.	.	1	4	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	3	3	3	3
162	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
163	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	2
164	.	.	.	.	.	.	3	.	1	2	.	.	2	.	.	3
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
166	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	1	9	1	1	1	1	1	1	3	3	.	.	3	3	.	3
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	1	1	1	4	.	4	1	1	5	4	.	.	7	1	1	2
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	1	.	1	.	1	.	1	.	.	.	.	.	3	3	5	5
175	.	.	.	.	.	.	.	.	.	.	.	.	3	1	.	.
176	.	3	.	3	.	.	.	1	.	.	.	.	1	1	2	2
177	.	.	.	.	.	.	.	.	.	.	.	.	.	1	5	5
178	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
148	2	.	5	3	5	5	5	5	5	5	5	5	5	.	.	.	1	1	1	5	1	.	5	.	1
149	.	3	3	5	5	5	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
150	.	.	.	3	.	.	2	.	5	5	5	5	.	.	.	.	.	.	.	.	.	.	.	.	1
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
153	1	1	1	1	5	5	5	5	2	5	5	5	5	5	5	.	5	5	5	2	5	.	5	.	1
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	1	1	1	3	3	3	3	5	5	5	5	5	.	.	.	.	3	3	3	3	.	.	.	.	5
156	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
157	5	5	1	3	5	5	5	5	5	5	5	2	5	2	2	.	1	5	5	2	2	.	5	.	.
158	3	1	.	3	3	3	5	.	5	5	5	1	5	5	3	.	2	5	5	7	7	.	5	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
163	5	5	1	1	1	2	5	5	5	5	5	1	1	.	.	.	.	.	.	.	.	.	.	.	3
164	3	5	.	.	.	2	.	.	.	.	.	.	.	.	5	.	3	3	.	.	.	.	.	.	.
165	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	3	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
169	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
170	3	.	.	2	5	5	5	2	5	5	5	5	5	5	5	.	5	5	5	5	5	.	5	.	3
171	.	.	.	.	.	.	.	3	3	3	3	5	2	2	2	.	.	.	.	.	.	.	.	.	.
172	2	.	.	.	.	2	2	5	3	5	5	.	5	5	5	.	5	5	5	5	.	.	2	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	.	5	5	5	5	5	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
177	5	.	.	5	5	2	3	2	3	5	3	5	3	.	.	.	.	.	.	.	3	.	7	.	.
178	3	.	.	.	.	3	3	3	3	3	3	3	3	3	3	.	.	.	.	.	.	.	.	.	5
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	.	.	.	7	7	.	7	.	7	.	.	.	.	.	.	.	7	7	7	7	.	.	.	.	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
145	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	2	2	.	3	.	.	.	3	.	.	.	.
148	1	2	.	2	2	2	.	2	.	2	.	.	.	.	.
149	.	2	2	3	3	2	3	2	2	3	.	.	.	.	.
150	1	.	2	.	.	2	.	2	.	2	.	.	.	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	.	.	.	.	.	8	.	8	8	.	.	.	.	.
153	.	2	.	2	2	2	2	2	2	2	2	2	2	2	2
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
156	.	.	.	.	.	.	.	.	8	.	8	.	.	.	.
157	2	.	2	2	2	2	2	2	2	2	2	2	2	2	.
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
162	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
163	.	.	2	2	2	2	2	2	2	2	2	2	2	2	2
164	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.
165	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
166	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
167	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
169	2	.	.	.	2	.	2	.	2	.	.	.	2	.	2
170	.	.	.	2	.	.	.	2	.	.	2	2	.	.	.
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	.	.	.	2	.	2	.	.	.	.	.	.	.
173	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
174	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
176	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
177	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
179	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
180	2	.	.	.	.	2	2	2	3	2	3	2	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
145	.	.	.	.	.	.	.	.	.	.	2	1	2
146	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	.	.	2	2	.	2
148	.	.	2	.	2	.	.	.	.	.	1	2	1
149	.	.	.	.	.	.	.	.	.	.	.	.	.
150	.	.	.	.	.	2	.	.	.	.	2	2	2
151	.	.	.	.	.	.	.	.	.	.	.	.	.
152	.	.	.	.	.	.	.	.	.	.	2	1	1
153	2	.	.	.	2	.	.	.	.	.	1	2	1
154	.	.	.	.	.	.	.	.	.	.	.	.	.
155	5	5	5	5	5	.	.	.	.	.	2	2	2
156	.	.	.	.	.	.	.	.	.	.	2	2	.
157	.	.	.	.	.	.	.	.	.	.	2	2	2
158	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	2	2	.
161	.	.	.	.	.	.	.	.	.	.	.	.	2
162	.	.	.	.	.	.	.	.	.	.	.	.	2
163	.	1	.	1	.	.	.	.	.	.	1	1	2
164	.	.	.	.	.	.	.	.	.	.	1	1	1
165	.	.	.	.	.	.	.	.	.	.	2	2	2
166	2	2	2	2	.	.	.	.	.	.	2	2	2
167	.	.	.	.	.	.	.	.	.	.	.	.	.
168	.	.	.	.	.	.	.	.	.	.	2	2	2
169	.	2	.	.	.	.	.	.	.	.	.	2	.
170	.	2	2	2	2	2	.	.	.	.	1	1	2
171	.	.	.	.	.	.	.	.	.	.	.	.	.
172	.	.	.	.	.	.	.	.	.	.	1	2	1
173	.	.	.	.	.	.	.	.	.	.	2	2	2
174	.	.	.	.	.	.	.	.	.	.	2	2	2
175	.	.	.	.	.	.	.	.	.	.	2	2	2
176	.	.	.	.	.	.	.	.	.	.	2	2	2
177	.	.	.	.	.	.	.	.	.	.	2	2	1
178	5	5	5	5	5	5	.	.	.	.	2	2	2
179	.	.	.	.	.	.	.	.	.	.	2	2	1
180	.	.	.	.	.	.	.	.	.	.	1	2	2

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
145	2	.	.	2	2	2	2	1	1	2	.	1	1	1
146	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	.	.	.	.	.	.	.	1	.	.	.	.	.	1
148	1	2	1	1	1	2	1	1	1	.	1	1	1	1
149	.	2	.	.	.	.	.	2	.	.	.	.	.	2
150	2	2	2	2	.	2	2	.	.	.	.	1	.	.
151	.	.	.	.	.	.	.	.	.	.	.	.	.	.
152	1	1	1	1	1	2	2	1	1	1	1	1	1	1
153	1	1	1	2	2	2	2	1	1	2	2	1	1	1
154	.	.	.	.	.	.	.	.	.	.	.	.	.	.
155	2	2	2	2	2	.	2	1	1	.	.	1	1	1
156	.	2	2	2	2	.	.	.	.	.	.	1	1	2
157	2	2	2	2	2	2	2	2	2	.	.	1	1	1
158	.	.	.	.	.	.	.	.	.	.	.	.	.	.
159	.	.	.	.	.	.	.	.	.	.	.	.	.	.
160	.	.	.	.	.	.	.	.	.	.	.	.	.	.
161	.	.	.	.	.	.	.	.	.	.	.	1	.	.
162	2	2	2	.	.	.	.	.	.	.	.	.	.	.
163	2	1	1	1	2	1	2	1	2	2	2	1	1	1
164	1	1	1	1	1	2	2	2	2	.	.	1	1	1
165	2	.	.	.	.	.	.	.	.	.	.	.	.	.
166	2	2	2	2	.	.	.	.	.	.	.	1	.	2
167	.	.	.	.	.	.	.	.	.	.	.	.	.	2
168	2	2	2	2	2	.	.	2	2	.	.	.	.	.
169	.	.	.	.	.	.	.	.	.	.	.	.	.	2
170	1	2	2	2	1	2	2	2	2	.	.	1	1	1
171	.	.	.	.	.	.	.	.	.	.	.	.	.	.
172	2	2	2	2	.	2	2	2	2	.	.	1	1	2
173	2	2	2	2	1	2	.	.	.	.	.	.	1	.
174	2	2	2	2	2	2	2	1	1	.	.	1	1	1
175	2	2	2	1	2	2	.	2	2	.	.	1	.	.
176	2	2	2	1	2	.	.	1	.	2	.	1	.	1
177	1	2	2	1	1	2	2	1	1	2	2	1	1	1
178	2	2	2	2	2	2	.	2	2	.	.	1	1	1
179	1	2	2	1	1	2	.	.	.	.	.	1	1	.
180	2	2	2	2	.	2	.	2	2	.	.	1	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
145	1	.	.	.	NLV	94	3	1	5	NNT	2 72
146	.	.	.	.	NLV	94	3	1	7	NNT	2 73
147	.	.	.	.	NLV	94	3	1	2	NNT	2 73A
148	1	.	.	.	NLV	94	3	2	1	NNT	2 74
149	2	.	.	.	NLV	94	3	2	1	NNT	2 75
150	.	.	.	.	NLV	94	3	1	2	NNT	2 76
151	.	.	.	.	NLV	94	3	3	5	NNT	2 77
152	1	.	.	.	NLV	94	3	2	2	NNT	2 78
153	1	.	.	.	NLV	94	3	2	1	NNT	2 79
154	.	.	.	.	NLV	94	3	3	5	NNT	2 80
155	1	.	.	.	NLV	94	3	2	5	NNT	2 81
156	2	.	.	.	NLV	94	3	2	6	NNT	2 82
157	2	.	.	.	NLV	94	3	2	1	NNT	2 83
158	.	.	.	.	NLV	94	3	1	2	NNT	2 85
159	.	.	.	.	NLV	94	3	2	7	NNT	2 86
160	.	.	.	.	NLV	94	3	3	6	NNT	2 86A
161	.	.	.	.	NLV	94	3	2	6	NNT	2 87
162	2	.	.	.	NLV	94	3	2	2	NNT	2 88
163	1	.	.	.	NLV	94	3	1	3	NNT	2 89
164	1	.	.	.	NLV	94	3	1	3	NNT	2 90
165	.	.	.	.	NLV	94	3	3	6	NNT	2 91
166	.	.	.	.	NLV	94	3	1	6	NNT	2 94
167	.	.	.	.	NLV	94	3	1	7	NNT	2 95
168	2	.	.	.	NLV	94	3	3	5	NNT	2 96
169	2	.	.	.	NLV	94	3	2	7	NNT	2 98
170	1	.	.	.	NLV	94	3	2	2	NNT	2 103
171	.	.	.	.	NLV	94	3	2	7	NNT	2 108
172	2	.	.	.	NLV	94	3	1	2	NNT	2 110
173	.	.	.	.	NLV	94	3	2	7	NNT	2 111
174	1	.	.	.	NLV	94	3	1	5	NNT	2 112
175	.	.	.	.	NLV	94	3	2	1	NNT	2 114
176	2	.	.	.	NLV	94	3	2	5	NNT	2 116
177	1	.	.	.	NLV	94	3	2	3	NNT	2 117
178	1	.	.	.	NLV	94	3	1	6	NNT	2 121
179	.	.	.	.	NLV	94	3	2	7	NNT	2 123
180	.	.	.	.	NLV	94	3	2	2	NNT	2 124

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	MANUB	STERNUM	XIPHOID	RCLAV	LCLAV	RGLEN	LGLEN	RSCAP	LSCAP	RACROM	LACROM	RCORAC	LCORAC	RHUM
181	.	.	.	.	6	.	1	.	.	.	.	.	.	.
182	.	.	.	.	4	.	1	.	.	.	.	.	1	.

OBS	LHUM	RRADIUS	LRADIUS	RULNA	LULNA	RISHIUM	LISHIUM	RILIUM	LILIUM	RPUBIS	LPUBIS	RFEMUR	LFEMUR
181	2	7	7	7	2	.	.	.	1	.	.	8	8
182	.	2	2	.	.	.	7	.	.	.	.	.	.

OBS	RPATEL	LPATEL	RTIBIA	LTIBIA	RFIBULA	LFIBULA	RLUNATE	LLUNATE	RSCAPH	LSCAPH	RTRAPEZ	LTRAPEZ
181	.	.	5	5	.	.	.	.	.	.	.	.
182	.	.	.	.	2	.	.	.	.	.	.	.

OBS	RTRAPZD	LTRAPZD	RCAPIT	LCAPIT	RHAMATE	LHAMATE	RTRIQ	LTRIQ	RPISI	LPISI	RMCI	LMCI	RMCII	LMCII
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	1	.	3

OBS	RMCIII	LMCIII	RMCIV	LMCIV	RMCV	LMCV	RHNDPHAL	LHNDPHAL	RHNDSES	LHNDSES	RTALUS	LTALUS	RCALCAN
181	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	1	.	.	.	.	.

OBS	LCALCAN	RCUBOID	LCUBOID	RNAVIC	LNAVIC	RCUNI	LCUNI	RCUNII	LCUNII	RCUNIII	LCUNIII	RMTI	LMTI
181	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.

SKELETAL ELEMENT INVENTORY RAW DATA FOR NON NOK THA

OBS	RMTII	LMTII	RMTIII	LMTIII	RMTIV	LMTIV	RMTV	LMTV	RFTPHAL	LFTPHAL	RFTSES	LFTSES	C1	C2	C3	C4
181	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
182	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.

OBS	C5	C6	C7	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	L1	L2	L3	L4	L5	L6	SACRUM	COCCYX	RRIB1
181	.	3	.	.	.	.	.	3	3	3	.	.	.	.	.	.	2	2	2	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	LRIB1	RRIB2	LRIB2	RRIB3	LRIB3	RRIB4	LRIB4	RRIB5	LRIB5	RRIB6	LRIB6	RRIB7	LRIB7	RRIB8	LRIB8
181	.	2	.	.	2	2	2	2	2	.	.	.	.	.	.
182	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

OBS	RRIB9	LRIB9	RRIB10	LRIB10	RRIB11	LRIB11	RRIB12	LRIB12	RRIB13	LRIB13	RFRONT	LFRONT	RPARIET
181	.	.	.	.	.	.	.	.	.	.	2	2	2
182	.	.	.	.	.	.	.	.	.	.	2	2	2

OBS	LPARIET	ROCCIP	LOCCIP	RTEMP	LTEMP	RFACE	LFACE	RMAX	LMAX	RSPHEN	LSPHEN	RPETRS	LPETRS	RMAND
181	2	2	2	2	2	2	2	1	1	.	.	1	1	2
182	2	2	.	.	.	.	.	2	2	.	.	.	.	.

OBS	LMAND	HYOID	CORACOID	THYROID	INSTIT	YREXAM	CARD	SEX	AGE	SITE	BURID
181	.	.	.	.	NLV	94	3	1	5	NNT	2 125
182	.	.	.	.	NLV	94	3	2	1	NNT	2M125

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